CLIMATE ACTION PLAN

CITY OF SANTA ROSA

Adopted June 5, 2012



City of
Santa Rosa
Community Development

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U.S. Department of Energy

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EXECUTIVE SUMMARY

City of Santa Rosa
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EXECUTIVE SUMMARY

The City of Santa Rosa has a long-standing commitment to implementing environmental programs and proactively working to reduce greenhouse gas (GHG) emissions. This Climate Action Plan (CAP) recognizes the imperative to act and demonstrates the City's continued commitment to reducing GHG emissions. The purpose of this Climate Action Plan is to present measures which will reduce local greenhouse gas emissions, to meet state, regional, and local reduction targets, and to streamline future environmental review of projects within Santa Rosa by following the California Environmental Quality Act (CEQA) Guidelines and meeting the Bay Area Air Quality Management District's (BAAQMD) expectations for a Qualified GHG Reduction Strategy. This CAP includes the following chapters:

- Introduction (Chapter 1)
- Scientific and Regulatory Framework (Chapter 2)
- GHG Emissions Inventory (Chapter 3)
- GHG Reduction Strategies (Chapter 4)
- Adaptation (Chapter 5)
- Implementation (Chapter 6)
- Glossary (Chapter 7)

Several appendices, described later in this Executive Summary, provide additional details and information.

INTRODUCTION

Chapter 1 provides a brief overview of the purpose and scope of this Climate Action Plan (CAP, Plan) and how this Plan will build off of the City's long-standing tradition of environmental stewardship and leadership. The City has prepared this Plan not only to meet the requirements of a Qualified GHG Reduction Strategy but to outline a clear path to successfully implementing policies, programs, and activities that will achieve the City's adopted GHG reduction targets. In 2005, the City, in coordination with the Climate Protection Campaign, Sonoma County and the other nine municipalities in Sonoma County, established one of the most aggressive GHG reduction targets in the state and nation by committing to reduce GHG emissions 25% below 1990 levels by 2015.

This project was funded through an Energy Efficiency and Conservation Block Grant (EECBG) through the U.S. Department of Energy (DOE) and the American Reinvestment and Recovery Act. One of the goals of the EECBG program is to facilitate planning efforts and projects that will have a quantifiable effect on reducing energy use and GHG emissions while stimulating the economy and creating jobs.

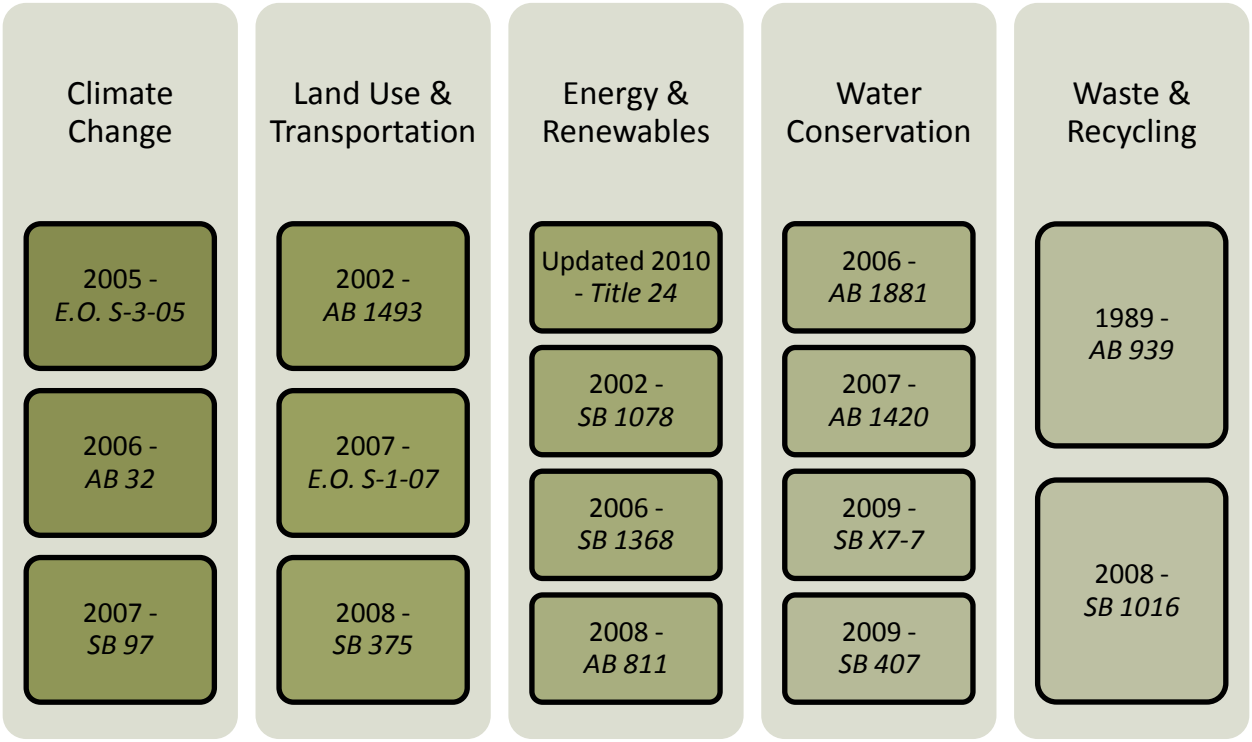
EXECUTIVE SUMMARY

SCIENTIFIC AND REGULATORY CONTEXT

The scientific and regulatory context that is guiding the preparation and implementation of this Plan is described in **Chapter 2.** By providing a brief overview of the science behind climate change and its potential global implications, as well as the federal, state, regional, and local regulatory framework that has shaped the development of this Plan, clarity on why and how the City is acting to reduce GHG emissions is revealed.

While the State of California has passed landmark legislation related to climate change, such as AB 32, SB 375, and SB 97, several other state laws related to climate change, land use and transportation, energy and renewables, water conservation, and waste and recycling are being implemented at both the state and local levels. These laws are highlighted in **Figure ES-1.**

FIGURE ES-1: CALIFORNIA REGULATORY FRAMEWORK SUMMARY



Sonoma County and its municipalities have adopted global warming pollution reduction targets and have committed to developing plans to obtain these targets. In August 2005, the Santa Rosa City Council adopted two GHG reduction targets for 2010 and 2015 via Council Resolution Number 26341. The resolution set a greenhouse gas emissions reduction target for City government operations of 20% from 2000 levels by 2010. Resolution 26341 also set a community-wide greenhouse gas emissions reduction target of 25% from 1990 levels by 2015.

GREENHOUSE GAS EMISSIONS INVENTORY AND FORECAST

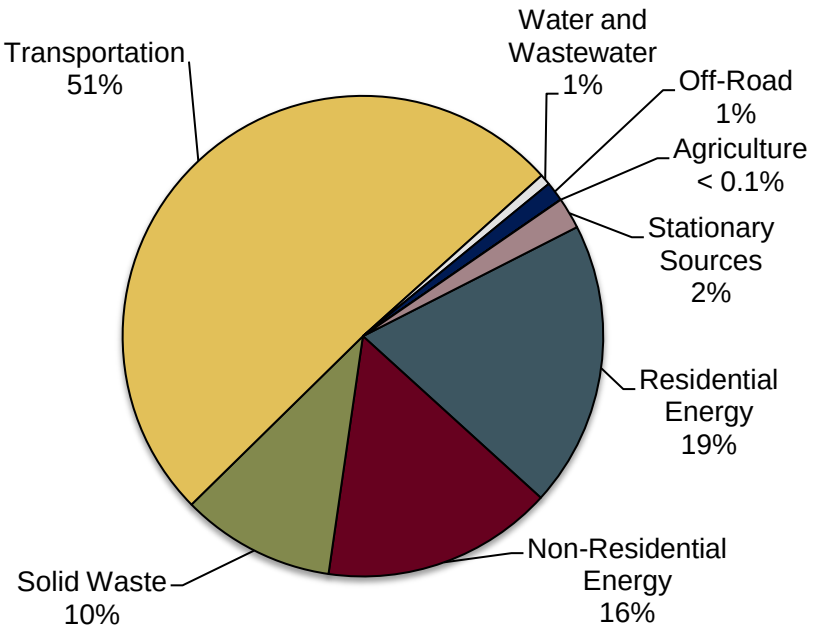
In order to develop strategies to reduce GHG emissions, the City must first assess baseline and forecast future GHG emissions. Inventories of GHG emissions from community-wide activities and municipal operations are described in **Chapter 3** and are summarized in **Table ES-1** and **Figure ES-2** and **Figure ES-3** below. A baseline year of 2007 was selected for the inventories to align with the City's General Plan.

TABLE ES-1: 2007 COMMUNITY-WIDE BASELINE EMISSIONS BY SECTOR

Sector	Metric Tons CO_2e/year	Percentage of Total
Residential Energy	259,640	19%
Non-Residential Energy	209,880	16%
Solid Waste	139,770	10%
Transportation	684,280	51%
Water and Wastewater	9,840	1%
Off-Road	17,670	1%
Agriculture	170	<0.1%
Stationary Sources	28,440	2%
TOTAL	**1,349,690**	**100%**

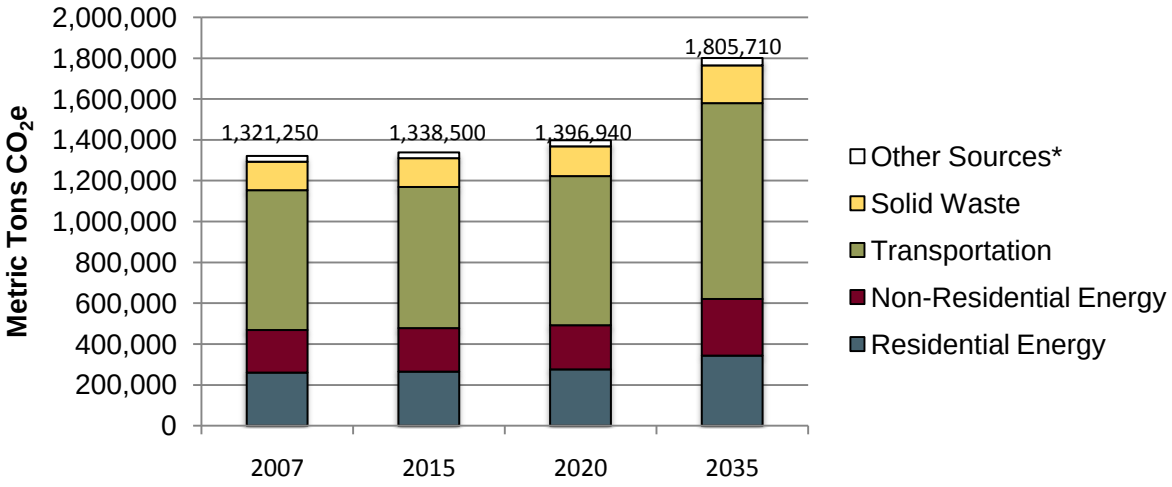
The community-wide inventory includes GHG emissions from activities such as electricity use, natural gas use, on-road transportation, solid waste disposal, water and wastewater, off-road equipment, agriculture, and stationary sources. The results of the baseline inventory estimate that in 2007 the City generated 1,349,690 metric tons of carbon dioxide equivalents ($MTCO_2e$) were generated. For the purposes of this CAP, stationary source emissions are excluded from this inventory, resulting in a community-wide total of 1,321,250 $MTCO_2e$. Stationary sources are excluded from this CAP, because the City lacks primary control over many of these facilities as they are permitted and regulated by the Bay Area Air Quality Management District.

FIGURE ES-2: 2007 COMMUNITY-WIDE BASELINE EMISSIONS BY SECTOR



A business-as-usual (BAU) projection is an estimate of how emissions would grow if consumption trends and efficiencies remain at their 2007 levels yet the number of people, households, and jobs continues to grow in Santa Rosa. In other words, it is the status quo scenario before state, regional, and local reduction efforts are taken into consideration. The business-as-usual projection utilizes the demographic projections from General Plan 2035 for commercial square footage, residential units, and population at buildout.

FIGURE ES-3: BUSINESS-AS-USUAL GHG FORECAST



** Other Sources include water/wastewater, agriculture, off-road representing less than 2% of the inventory.*

SANTA ROSA'S STRATEGY TO REDUCE GHG EMISSIONS

In order to achieve the AB 32 state-recommended reduction target of 15% below 2008 emissions levels by 2020 and the locally adopted reduction target of 25% below 1990 levels, the City of Santa Rosa will need to implement the goals, policies, and actions set forth in this document. The City's strategy is structured around the following nine topic areas:

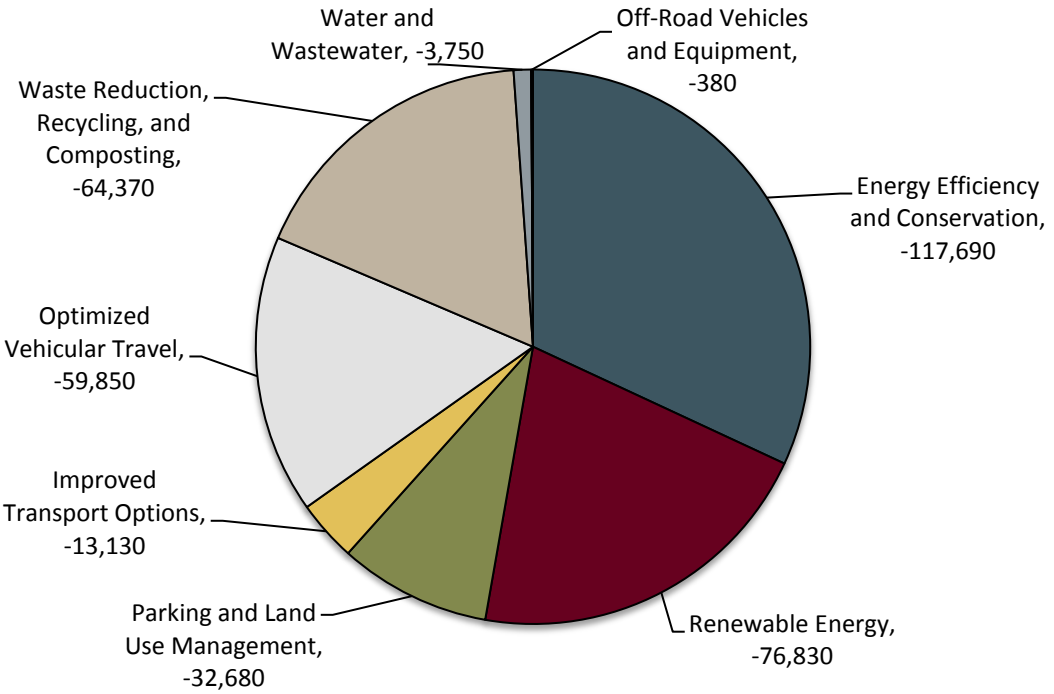
1. Energy Efficiency and Conservation
2. Renewable Energy
3. Parking and Land Use Management
4. Improved Transport Options
5. Optimized Vehicular Travel
6. Waste Reduction, Recycling, and Composting
7. Water and Wastewater
8. Agriculture and Local Food
9. Off-Road Vehicles and Equipment

The reduction measures included in this Plan build upon measures included in previous efforts, particularly the Climate Protection Campaign's Community Climate Action Plan, and are a diverse mix of regulatory and incentive-based programs for both new and existing development. The reduction measures also aim to reduce GHG emissions from each source to avoid reliance on any one strategy or sector to achieve the target. In total, existing actions, state programs, and GHG reduction measures in this Plan will reduce GHG emissions in the City of Santa Rosa in 2020 by 558,090 $MTCO_2e$ (see **Table ES-2** and **Figure ES-4**). This level of reduction will meet the City's GHG reduction target in 2020 rather than 2015. It also exceeds the GHG reductions necessary to meet AB 32 targets for 2020. Beyond 2020, there is a continued need to reduce GHG emissions even further, which is why this plan includes a forecast and GHG reduction strategies out to 2035.

TABLE ES-2: GHG REDUCTION SUMMARY BY TOPIC

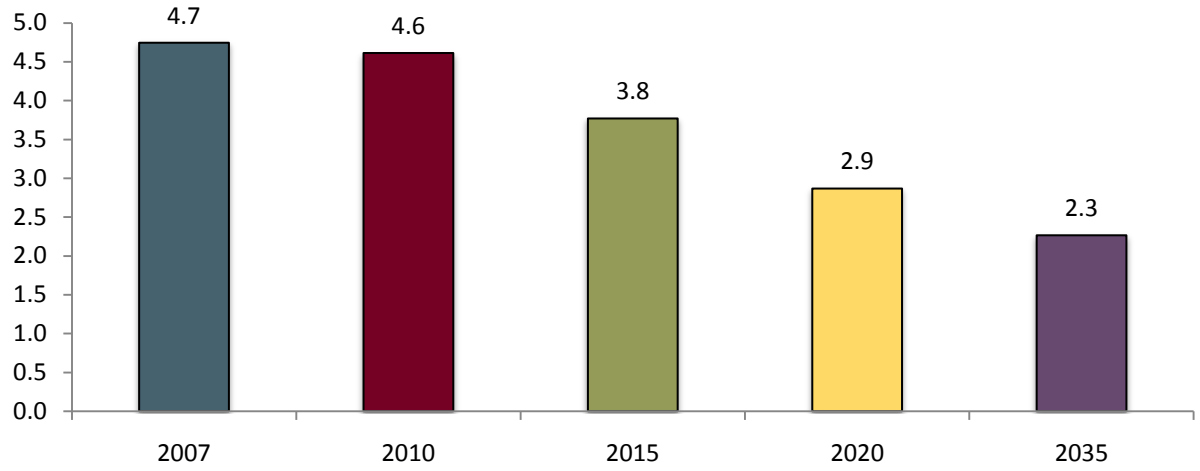
Goal Topic	2015	2020	2035
State Programs	-84,400	-161,760	-387,040
Existing Local Programs	-26,920	-27,640	-40,110
Energy Efficiency and Conservation	-26,060	-117,690	-142,340
Renewable Energy	-30,380	-76,830	-85,520
Parking and Land Use Management	-11,860	-32,680	-39,900
Improved Transport Options	-3,080	-13,130	-15,960
Optimized Vehicular Travel	-19,980	-59,850	-122,070
Waste Reduction, Recycling, and Composting	-25,170	-64,370	-129,720
Water and Wastewater	-2,410	-3,750	-6,170
Agriculture and Local Food	0	0	0
Off-Road Vehicles and Equipment	-360	-380	-500

FIGURE ES-4: 2020 EMISSIONS REDUCTIONS BY GOAL ($MTCO_2E$)



Achievement of the City's adopted target by 2020 will exceed state recommendations and BAAQMD threshold requirements for developing a Qualified GHG Reduction Strategy by approximately 22%. As shown in **Figure ES-5**, through the implementation of this Plan, the City's GHG emissions will decrease from 4.7 $MTCO_2e$ per person per year in 2007 to 2.3 $MTCO_2e$ per person per year in 2035.

FIGURE ES-5: GHG EMISSIONS PER SERVICE POPULATION ($MTCO_2E$)



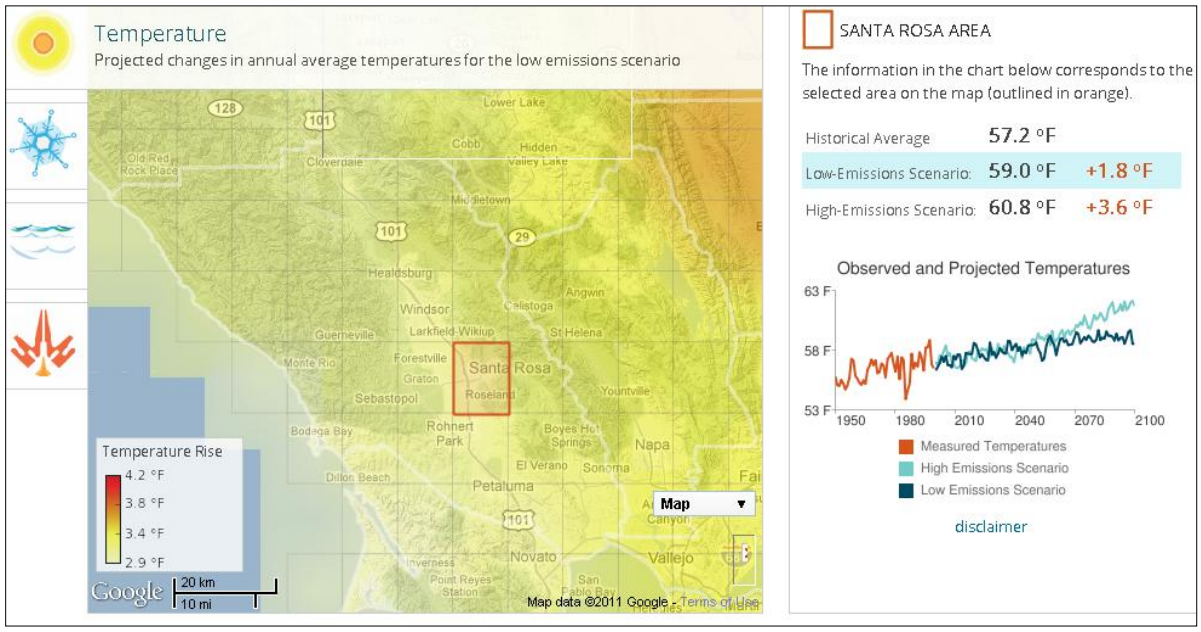
ADAPTING TO CLIMATE CHANGE

Even with significant efforts to mitigate GHG emissions today, future climate projections and scenarios anticipate that climate change may have significant effects on California's precipitation, temperature, and weather patterns. Santa Rosa is located in Northern California within Sonoma County in the San Francisco Bay Area. The adaptation chapter of this document summarizes the anticipated effects climate change may have on California and the Northern California region, which may include:

- Increased wildfire risk;
- Negative impacts to wildlife and its habitat;
- Deteriorating public health;
- Decreased supply of fresh water;
- Increased sea level rise.

The adaptation chapter also summarizes current efforts at the state and regional level to address climate change adaptation such as the Cal-Adapt tool (shown in **Figure ES-6**) and the San Francisco Planning and Urban Research's (SPUR) Climate Change Hits Home Report, which identifies a "plan of action" for local governments in the Bay Area to begin to address future impacts of climate change.

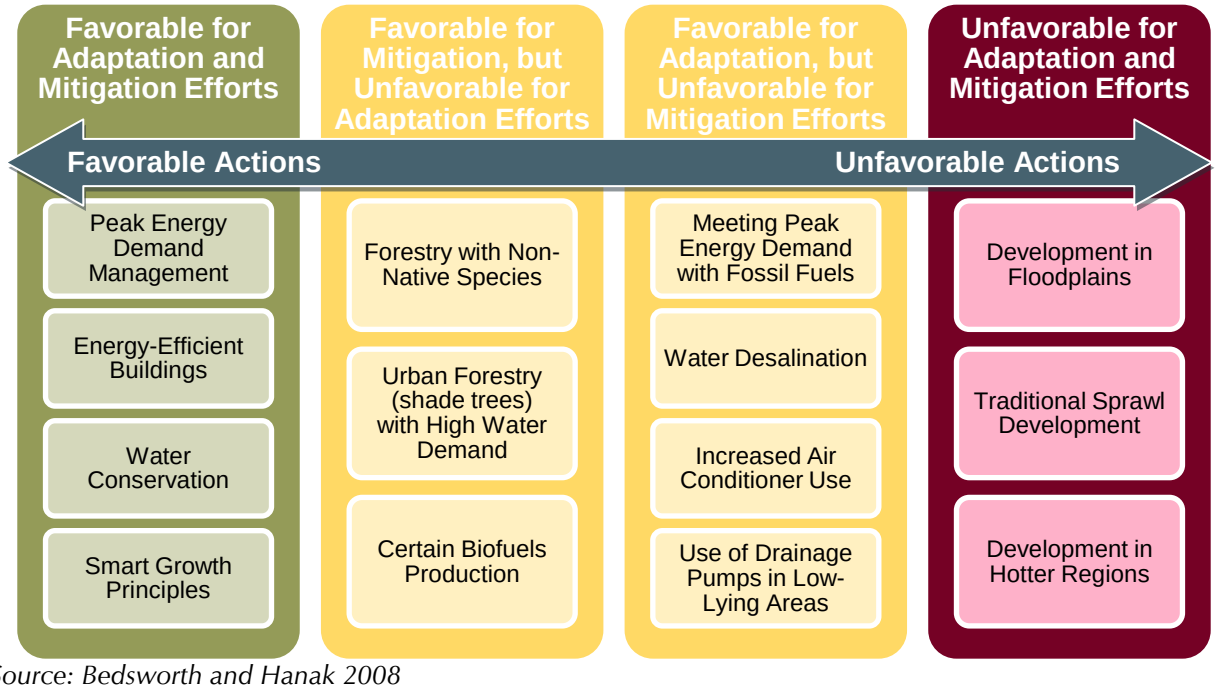
FIGURE ES-6: CAL-ADAPT TEMPERATURE MAP AND PROJECTIONS



Source: California Energy Commission 2011. Cal-Adapt Local Climate Snapshots.

Finally, the adaptation chapter directs the City to increase regional coordination and involvement in climate change adaptation efforts. It should be noted that many GHG reduction (mitigation) measures can double as adaptation measures, as described below in **Figure ES-7.**

FIGURE ES-7: COMPLEMENTARY AND CONFLICTING ADAPTATION & MITIGATION ACTIONS



Source: Bedsworth and Hanak 2008

IMPLEMENTING THIS PLAN

To ensure successful implementation of the CAP, several strategies and supporting actions have been identified in the implementation chapter. This section also includes an implementation matrix with details specific to each measure such as the responsible department, implementation time frame, and co-benefits. The implementation matrix will be a critical tool to monitor the City's progress toward implementing the CAP.

APPENDICES AND SUPPLEMENTAL MATERIALS

To streamline the main document, several technical appendices have been prepared to provide additional detail and information regarding GHG reductions, costs, and sources. This Plan includes the following six appendices:

- Technical memo on GHG emissions inventory results and methodologies (**Appendix A – Baseline GHG Inventory**);
- Summary of sources and assumptions used to estimate GHG reductions for each reduction measure (**Appendix B – GHG Methodology**);
- Summary of sources, assumptions, and potential funding sources for each reduction measure (**Appendix C – Costs & Savings**);
- Detailed discussion of how this Plan will satisfy BAAQMD requirements for a Qualified GHG Reduction Strategy (**Appendix D – BAAQMD Compliance**);
- A checklist to be completed by new project development applicants to demonstrate compliance with the CAP (**Appendix E – New Development Checklist**); and
- Works utilized in this document (**Appendix F – Works Cited**).

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CHAPTER 1 –
INTRODUCTION

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1. INTRODUCTION

Local governments play a primary role in reducing greenhouse gas emissions and mitigating the potential impacts of climate change. The City of Santa Rosa has a long-standing commitment to implementing environmental programs and proactively working to reduce greenhouse gas (GHG) emissions. This Climate Action Plan (CAP; Plan) recognizes the imperative to act and demonstrates the City's continued commitment to reducing GHG emissions. This CAP covers the following topics:

- Introduction (Chapter 1)
- Scientific and Regulatory Framework (Chapter 2)
- GHG Emissions Inventory (Chapter 3)
- GHG Reduction Strategies (Chapter 4)
- Adaptation (Chapter 5)
- Implementation (Chapter 6)
- Glossary (Chapter 7)

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- A checklist to be completed by new project development applicants to demonstrate compliance with the CAP (**Appendix E – New Development Checklist**); and
- Works utilized in this document (**Appendix F – Works Cited**).

A. PURPOSE AND SCOPE

This Climate Action Plan is intended to streamline future environmental review of development projects in Santa Rosa by following the California Environmental Quality Act (CEQA) Guidelines and meeting the Bay Area Air Quality Management District's (BAAQMD) expectations for a Qualified GHG Reduction Strategy.

B. LOCAL PROFILE

Santa Rosa is a mid-sized city located in central Sonoma County. The Urban Growth Boundary, which encompasses approximately 45 square miles, is the focus of this Climate Action Plan. Although climate change is a global issue, the City of Santa Rosa recognizes that many strategies at the local level can help prevent its progression. The City Council adopted goals for 2011–2016 that included:

Council Strategic Goal #3: Provide Leadership on Environmental Initiatives

- Partner regionally to reduce greenhouse gases through planning, education, and outreach
- Develop and implement Santa Rosa's Climate Action Plan to achieve state, regional, and local GHG emissions targets
- Identify opportunities for improved efficiencies as it relates to energy, water, and waste for City operations
- Develop a strategic education and outreach program to improve public engagement and participation in community-wide GHG reduction efforts
- Partner regionally to move toward 100% renewable electricity energy sources
- Improve our transportation system to reduce vehicle emissions and promote multi-modal transportation

C. LOCAL CLIMATE PROTECTION EFFORTS

The City of Santa Rosa has been a leader in climate protection activities since the mid 1990s. The City and the community have been working together toward shared environmental objectives, and the City has been leading by example in its municipal operations through energy efficiency upgrades and several greenhouse gas emissions-reducing projects, programs, and policies. This Climate Action Plan outlines what has been accomplished thus far and what path is necessary to lead the City toward attainment of federal, state, regional, and local GHG reduction goals.

In 2000, the City initiated an important first step by quantifying emissions from City operations, as documented in the municipal GHG inventory. This inventory provided the basis on which to measure the success of municipal greenhouse gas reduction efforts.

In 2005, Sonoma County and its nine municipalities set a mutual greenhouse gas reduction target in partnership with the Climate Protection Campaign (CPC), a local organization working on

climate change. The target is to reduce GHG emissions 25% below 1990 levels by 2015, one of the most aggressive targets in the country. To help Sonoma County local governments reach this goal, the CPC published the Community Climate Action Plan (CCAP), which recommends regional solutions to reduce emissions from buildings, transportation sources, the electrical grid, agriculture, forestry, and solid waste. The CCAP was drafted with considerable input from a team of consultants, experts, community representatives, and a skilled steering committee.

On August 2, 2005, the Santa Rosa City Council adopted Council Resolution Number 26341, which established a municipal greenhouse gas reduction target of 20% from 2000 levels by 2010 and facilitates the community-wide greenhouse gas reduction target of 25% from 1990 levels by 2015 that was established in the CCAP.

In 2008, a City GHG Work Group was established to identify emissions reduction targets, policies, programs, and actions to reduce emissions as well as to develop a framework for advancing the City's greenhouse gas reduction goals. An Environmental Projects team was created to forward these goals and to provide environmentally friendly and economical solutions to the delivery of water and the use and treatment of wastewater.

In 2009, the Regional Climate Protection Authority (RCPA) was created to improve coordination on climate change issues and establish a clearinghouse for countywide efforts to reduce GHG emissions. Also in 2009, the City adopted a revised General Plan that includes a number of policies directed at greenhouse gas emissions reduction.

The City's objective to lead by example and reduce its municipal emissions is being accomplished by encouraging the use of renewable energy through implementing solar, biomass, wind, and alternative fuels into everyday operations. By encouraging the use of renewable energy, the City has reduced its energy demands and water consumption through various conservation projects such as the beneficial reuse of recycled wastewater and bio-solids. The City has also adopted an Environmentally Preferable Purchasing Policy, along with many other greenhouse gas emissions reduction initiatives. Specific projects initiated by the City to reduce GHG emissions include:

- 323 kilowatts of photovoltaic installed;
- Santa Rosa Build It Green voluntary program evolving to a mandatory Tier 1 CALGreen program;
- City hybrid, compressed natural gas (CNG), and electric fleet vehicle upgrades;
- Variable Frequency Drive pumps for water pumping;
- Cool roofs and more efficient lighting and HVAC installed in City-owned buildings;
- Outreach efforts including initiating the "Climate Protection: Everybody Profits" conferences, Earth Day events, and Solar Sonoma County;
- Implementation of citywide Water Conservation Program;

- Increased volume of treated wastewater sent to the Geysers to generate electricity;
- Biomass-to-energy program;
- Hybrid buses and rideshare outreach programs;
- Clean Energy Advocate Program participant;
- ICLEI member since 2003;
- Solar America Cities participant;
- Countywide Retrofit Program;
- Sonoma County Energy Independence Program participant.

D. PUBLIC PARTICIPATION

Development of the Climate Action Plan relies heavily on community involvement. As part of this project, community input was gathered though a series of community workshops and meetings of a stakeholder working group. The group included seven community members representing business, environmental, building, and public health groups, along with a local resident and business owner. Public input gathered has been integrated into the document in order to develop a plan that reflects community sentiment and has community support.

E. RELATIONSHIP TO THE GENERAL PLAN

The Santa Rosa General Plan 2035 supports the responsibility to continue facilitating greenhouse gas (GHG) emissions reductions. Measures, policies, and projects that reduce community-wide GHGs presented in the Climate Action Plan are aligned with the goals and policies of the General Plan. The measures presented in Chapter 4 of the Climate Action Plan are referenced generally throughout the General Plan, and the Climate Action Plan is referenced specifically in the General Plan Open Space and Conservation Element. There are also numerous policies included in the General Plan that reduce greenhouse gas emissions; these policies are illustrated with a leaf and listed in an appendix at the end of the General Plan.

F. CEQA AND ENVIRONMENTAL REVIEW

In order to operate effectively as a programmatic tiering environmental document, the California State Attorney General's Office and BAAQMD both recommend integration of components of the GHG emissions reduction strategy into the General Plan. This integration will identify how the GHG emissions reduction strategy operates as a policy and implementation document that is updated every five years to respond to updates in science, technology, and policy. The GHG emissions reduction strategy will contribute to the General Plan's policies and will serve as mitigation for the City's GHG emissions.

The City has prepared environmental review in compliance with the requirements of the California Environmental Quality Act through development of a Supplemental Environmental Impact Report to the General Plan EIR. This document finds that the CAP will have a less than significant environmental impact for all impacts analyzed.

G. PREPARATION OF THIS PLAN

This Plan is funded by a generous grant from the U.S. Department of Energy as part of the American Recovery and Reinvestment Act of 2009.

In September 2009, the City was awarded an Energy Efficiency and Conservation Block Grant (EECBG) from the United States Department of Energy (DOE) to develop a program that would demonstrate reductions in greenhouse gases. The purpose of these funds and this Climate Action Plan is to empower local communities to make strategic investments to meet the nation's long-term goals for energy independence and leadership in climate change by:

- Reducing fossil fuel emissions;
- Reducing the total energy use of eligible entities;
- Improving energy efficiency in transportation, building, and other appropriate sectors; and
- Creating and retaining jobs.

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CHAPTER 2 –
SCIENTIFIC & REGULATORY CONTEXT

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2. SCIENTIFIC & REGULATORY CONTEXT

In order to make meaningful and effective decisions regarding greenhouse gas reductions, it is important to understand the scientific and regulatory framework under which this Plan has been developed. This chapter provides a brief introduction to the scientific research efforts to understand how climate change occurs and its global implications. Discussion following the scientific overview includes the federal, state, regional, and local regulations that provide guidance and inform the development of this Plan.

A. CLIMATE CHANGE SCIENCE OVERVIEW

Since the early 1990s, scientific consensus holds that the world's population is releasing greenhouse gases faster than the Earth's natural systems can absorb them. These gases are released as by-products of fossil fuel combustion, waste disposal, energy use, land-use changes, and other human activities. This release of gases such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) creates a blanket around the earth that allows light to pass through but traps heat at the surface, preventing its escape into space. While this is a naturally occurring process known as the greenhouse effect, human activities have accelerated the generation of greenhouse gases beyond natural levels. The overabundance of greenhouse gases in the atmosphere has led to an unexpected warming of the Earth and has the potential to severely impact the Earth's climate system.

While often used interchangeably, there is a difference between the terms "climate change" and "global warming." According to the National Academy of Sciences, climate change refers to any significant, measurable change of climate lasting for an extended period of time that can be caused by both natural factors and human activities.[1] Global warming, on the other hand, is an average increase in the temperature of the atmosphere caused by increased greenhouse gas emissions. The use of the term climate change is becoming more prevalent because it encompasses all changes to the climate, not just temperature.

B. GLOBAL CLIMATE CHANGE IMPACTS

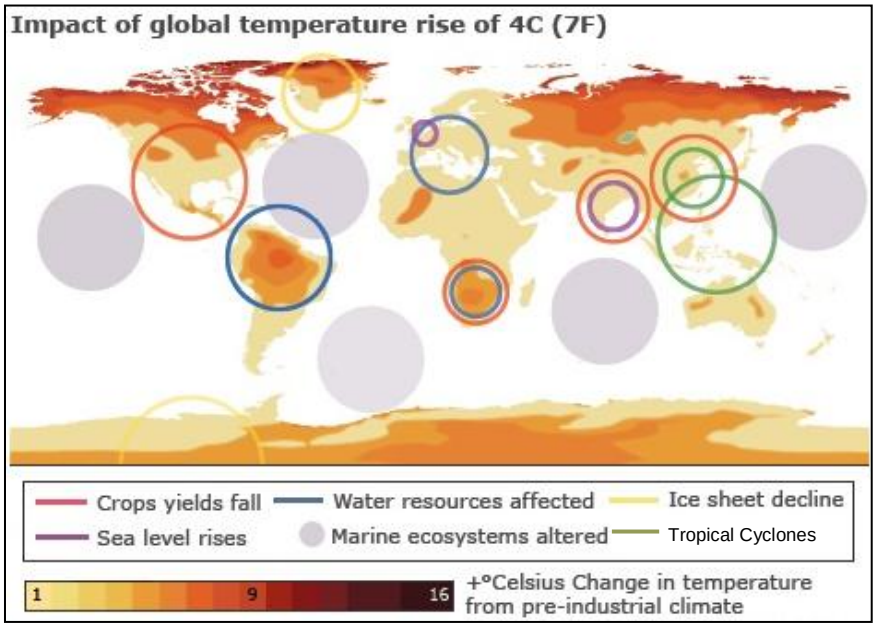
The Intergovernmental Panel on Climate Change's (IPCC) Fourth Assessment Report's Working Group I Summary for Policymakers summarizes current scientific understanding of global climate change and projects future climate change using the most comprehensive set of recognized global climate models.[2] The report incorporates the current effects of global climate change and includes an increase in tropical cyclone intensity, a loss in seasonally frozen ground, and an increase in drought intensity.

As asserted in the IPCC Fourth Assessment Report, if trends remain unchanged, continued GHG emissions above current rates will induce further warming changes in the global climate system and pose even greater risks than those currently witnessed. The impact of additional warming on the global climate is shown in **Figure 1.**

[1] National Academy of Sciences 2008
[2] IPCC 2007

Given the scientific basis of climate change facts and expected trends, the challenge remains to prepare for and mitigate climate change through deliberate global and local action.

FIGURE 1:POTENTIAL GLOBAL CLIMATE CHANGE IMPACTS



Source: Met Office, Hadley Centre 2009

C. REGULATORY CONTEXT

Santa Rosa's climate action efforts will be implemented within a robust federal, state, regional, and local framework. Although the federal government has yet to enact legislative targets for reducing greenhouse gas emissions, California was the first state in the nation to adopt GHG emissions reduction targets in 2006 under Assembly Bill 32 (AB 32). This section highlights the federal, state, and local legislative framework guiding the preparation and implementation of this Plan.

D. FEDERAL FRAMEWORK

While current federal government regulations lack strict emissions reduction targets, there are a variety of ways that the federal government is supporting emissions reduction efforts of state and local governments. Numerous proposals are currently under way at the federal level to limit emissions from power plants, impose pricing on carbon emissions, and provide federal energy efficiency legislation.

Federal agencies have undertaken a concerted effort to assist state and local governments, businesses, and residents with efforts related to energy, climate action planning, and smart growth. The Environmental Protection Agency (EPA) also provides educational resources and analytical tools in support of GHG analysis and climate action planning.

Clean Air Act

Under the Clean Air Act (CAA), the EPA is required to regulate and set emissions standards for "any air pollutant" from motor vehicles that has the potential to endanger public health or welfare.

Beginning in 2011, the EPA has the authority to regulate GHG emissions from new power plants and refineries through a set of New Source Performance Standards (NSPS). These regulations will be finalized and applied to all new stationary sources by 2012.

Efficiency and Conservation Block Grants

In addition to the EPA's regulatory authority to manage greenhouse gas emissions, the 2009 American Reinvestment and Recovery Act (ARRA) package has supported state and local government investment in greenhouse gas reduction activities through Energy Efficiency and Conservation Block Grant (EECBG) funding. The EECBG program, managed under the U.S. Department of Energy, has provided a total of $3.2 billion to cities and counties across the United States to invest in energy efficiency and reduce fossil fuel emissions from the building and transportation sectors, thereby reducing greenhouse gas emissions.

E. CALIFORNIA LEGISLATIVE FRAMEWORK

The State of California is the 15th largest emitter of greenhouse gases in the world, ultimately accounting for 2% of global greenhouse gas emissions.[3] However, the State has been proactive in working to reduce emissions and has a long history of proven leadership in addressing energy and climate issues spanning the last 40 years. In 1988, Assembly Bill (AB) 4420 (Sher, Chapter 1506, Statutes of 1988) designated the California Energy Commission (CEC) as the lead agency for climate change issues in California.[4] Since that time, there have been numerous initiatives in California to address climate change and energy efficiency, with the majority of legislation passed between 2000 and 2011. These initiatives have strengthened the ability of entities in California to engage in accurate data collection and have created ambitious targets and regulations that will directly lead to reductions in greenhouse gas emissions. Not only have California's efforts earned it a role as the leader in the United States for climate planning strategies, but the State has received world attention and accolades for its efforts.

California legislation related to climate change includes Executive Order S-3-05, Assembly Bill (AB) 32, and Senate Bill (SB) 375, which direct the State and other local agencies to reduce GHG emissions. These orders and laws are summarized below. In addition to Executive Order S-3-05, AB 32, and SB 375, the State has enacted legislation and policy initiatives related to climate change, transportation and vehicle efficiencies, energy, water, and solid waste. A summary of recent state efforts by topic is provided below in **Figure 2.**

[3] California Air Resources Board, California Climate Action Registry, ICLEI-Local Governments for Sustainability 2010.
[4] California Energy Commission 2009.

Executive Order S-3-05

Executive Order S-3-05 establishes the California Environmental Protection Agency (CalEPA) as the agency responsible for coordinating the State's effort to achieve the (non-binding) progressive greenhouse gas emissions reduction targets outlined in the executive order for the state:

- By 2010, reduce greenhouse gas emissions to 2000 levels;
- By 2020, reduce greenhouse gas emissions to 1990 levels;
- By 2050, reduce greenhouse gas emissions to 80% below 1990 levels.

California Global Warming Solutions Act

Assembly Bill 32, known as the California Global Warming Solutions Act, was approved by the legislature and signed by Governor Schwarzenegger in 2006. The landmark legislation requires the California Air Resources Board (CARB) to develop regulatory and market mechanisms that will reduce greenhouse gas emissions to 1990 levels by 2020.[5] Mandatory actions under the legislation to be completed by CARB include:

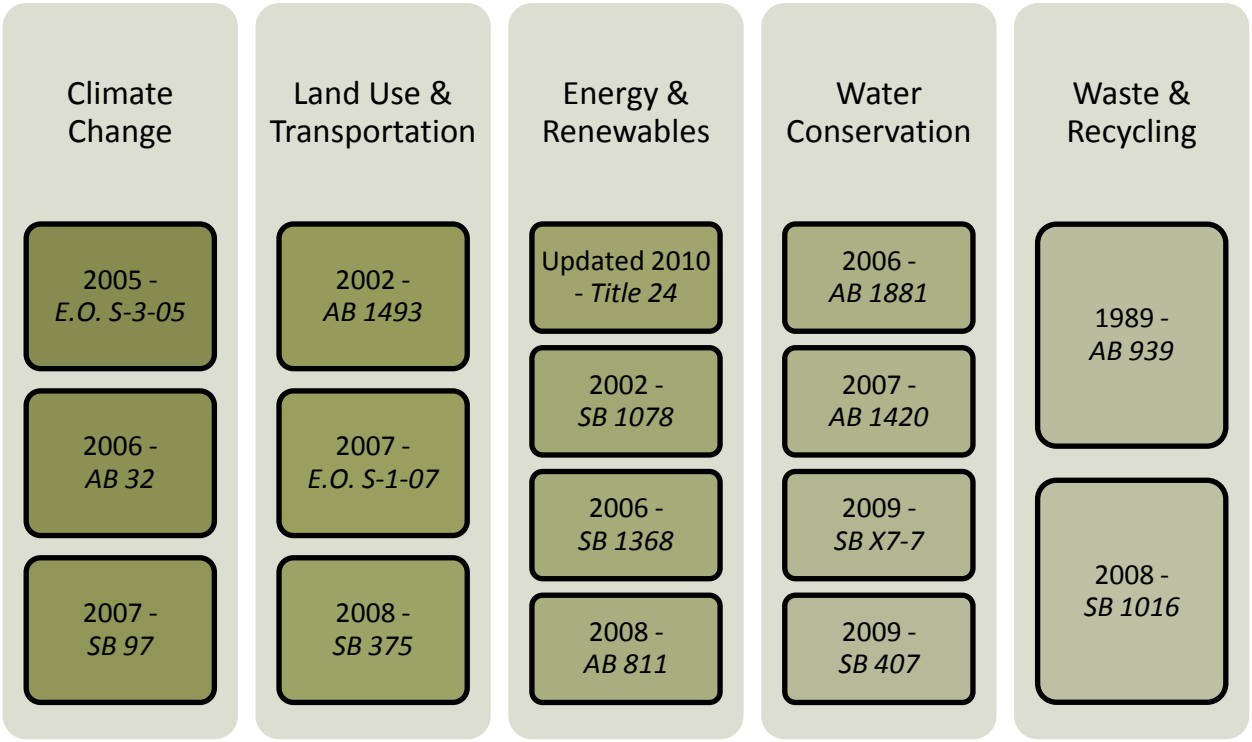
- Identification of early action items that can be quickly implemented to achieve greenhouse gas reductions. These early action items were adopted by CARB in 2007 and include regulations affecting landfill operations, motor vehicle fuels, car refrigerants, and port operations, among other regulations.
- Development of a scoping plan to identify the most technologically feasible and cost-effective measures to achieve the necessary emissions reductions to reach 1990 levels by 2020. The scoping plan employs a variety of GHG reduction measures that include direct regulations, alternative compliance mechanisms, incentives, voluntary actions, and market-based approaches like a cap-and-trade program. The plan identifies local governments as strategic partners to achieving the state goal and translates the reduction goal to a 15% reduction of current emissions by 2020.
- Creation and adoption of regulations to require the state's largest industrial emitters of greenhouse gases to report and verify their greenhouse gas emissions on an annual basis.

Sustainable Communities and Climate Protection Act

Senate Bill 375 builds off of AB 32 and aims to reduce GHG emissions by linking transportation funding to land use planning. It requires metropolitan planning organizations (MPOs) to create a Sustainable Communities Strategy (SCS) in their regional transportation plans (RTPs) for the purpose of reducing urban sprawl. The SCS will demonstrate how the region will achieve the greenhouse gas emissions reduction target set by CARB for 2020 and 2035.

[5] California Air Resources Board 2010.

FIGURE 2:CALIFORNIA REGULATORY FRAMEWORK SUMMARY



F. STATE GUIDANCE AND REPORTS ON CLIMATE CHANGE

AB 32 Scoping Plan

In 2008, CARB approved the AB 32 Scoping Plan outlining regulatory and market mechanisms to achieve the goal of AB 32. The plan cites local government action as an integral partner to achieving the State's goals and translates the reduction goal to a 15% reduction of current emissions by 2020.

SB 97 – CEQA Guideline Amendments

Senate Bill 97 was adopted in 2007 by the State of California and directed the Governor's Office of Planning and Research (OPR) to amend the California Environmental Quality Act (CEQA) Guidelines to address greenhouse gas emissions. The CEQA Guidelines prepared by OPR were adopted in December 2009 and went into effect March 18, 2010. Local governments may use adopted plans consistent with the CEQA Guidelines to assess the cumulative impacts of projects on climate change, if the adopted plan includes a certified environmental impact report (EIR) or adoption of an environmental document. In order to benefit from the streamlining provisions of the CEQA Guidelines, a plan for the reduction of greenhouse gas emissions must accomplish the following:

- Quantify greenhouse gas emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic area;

- Establish a level, based on substantial evidence, below which the contribution to greenhouse gas emissions from activities covered by the plan would not be cumulatively considerable;
- Identify and analyze the greenhouse gas emissions resulting from specific actions or categories of actions anticipated within the geographic area;
- Specify measures or a group of measures, including performance standards, that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions level;
- Establish a mechanism to monitor the plan's progress toward achieving the level and to require amendment if the plan is not achieving specified levels;
- Be adopted in a public process following environmental review.

In response to the updated CEQA Guidelines, the Bay Area Air Quality Management District has adopted thresholds of significance for greenhouse gas emissions. These thresholds are used in the environmental review process for plans and projects by local governments and may streamline the environmental review process.

G. BAAQMD GUIDANCE AND CEQA TIERING

The Bay Area Air Quality Management District CEQA Air Quality Guidelines were developed to assist lead agencies in evaluating air quality impacts for projects and plans in the San Francisco Bay Area Air Basin. The guidelines were updated in 2010 to include guidance on assessing greenhouse gas and climate change impacts as required under CEQA Section 15183.5(b) and to establish thresholds of significance for impacts related to greenhouse gas emissions. These thresholds can be used to assess plan-level and project-level impacts and allow a lead agency to determine that a project's impact on GHG emissions is less than significant if it is in compliance with a Qualified Greenhouse Gas Reduction Strategy. This Climate Action Plan (CAP; Plan) meets the programmatic threshold of the BAAQMD guidelines.

This CAP follows both the CEQA Guidelines and the BAAQMD guidelines by incorporating the standard elements of a Qualified GHG Reduction Strategy. Appendix D describes in detail how the City's Climate Action Plan satisfies the BAAQMD's requirements for a Qualified GHG Reduction Strategy and will allow future development projects to determine that a project has a less than significant impact on GHG emissions if it complies with the City's Climate Action Plan.

CHAPTER 3 –

GHG EMISSIONS INVENTORY

City of Santa Rosa
Community Development

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3. GHG EMISSIONS INVENTORY

The baseline greenhouse gas emissions (GHG) inventory identifies the major sources of GHG emissions within the Santa Rosa Urban Growth Boundary and provides a baseline against which future progress can be measured.

Specifically, this inventory does the following:

- Calculates GHGs from community-wide activities, including municipal (City government) operations, within the City's Urban Growth Boundary in calendar year 2007;
- Details the impact of municipal operations on overall community-wide emissions;
- Provides City decision-makers and the community with adequate information to inform policy decisions; and
- Forecasts how emissions will grow in the community if no changes or policies to reduce GHG emissions are made.

How is an inventory different from a carbon footprint?

It is important to note the difference between a GHG inventory and a carbon footprint. A GHG emissions inventory incorporates GHG emissions that occur within the boundaries of a city based on adopted protocols and industry standards. The consistency allows GHG inventories to be compared and used in policy decisions. On the other hand, a carbon footprint includes GHG emissions from the region, and it is difficult to accurately estimate the community's contribution to the carbon footprint. Accordingly, a carbon footprint has limited value as a basis for policy decisions.

INVENTORY PURPOSE AND BACKGROUND

The 2007 inventory represents a key step in the City of Santa Rosa's efforts to improve air quality, enhance sustainability, and ensure the safety and comfort of its residents for generations to come. In addition, this inventory allows the City to quantitatively track its efforts related to energy efficiency and the mitigation of greenhouse gas emissions.

The inventory is split into a community-wide baseline inventory, detailing the sources of emissions from community activities, and a municipal operations inventory, identifying the sources and quantities of GHG emissions from activities on City-owned or -operated property or by City employees.

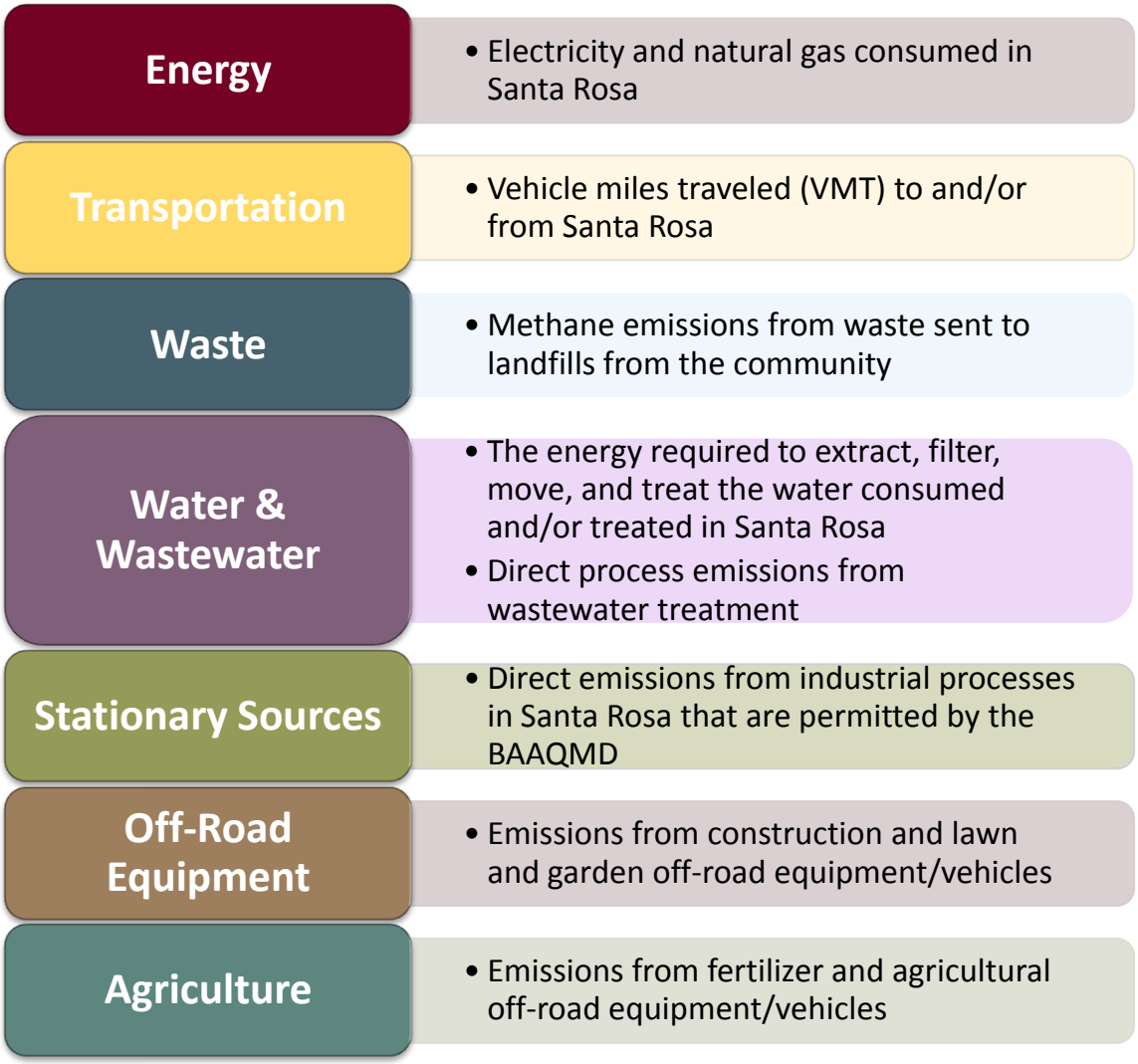
The community-wide baseline GHG inventory has been divided into seven sectors, or sources of GHG emissions, including residential energy use, commercial and industrial energy use, on-road transportation, solid waste, water-related energy use, stationary sources, off-road equipment, and agriculture (see **Figure 3**). Calculating GHG emissions by sector allows the City to align GHG emissions reduction programs with the largest sources of emissions, making the inventory an integral component of the City's sustainability efforts.

The City of Santa Rosa Municipal Operations Inventory provides a more detailed analysis of the City's streetlights, building energy use, fleet vehicles, waste disposal, and other City emissions. Conducting a more in-depth analysis of City operations by individual facility or vehicle allows the City to incorporate potential emissions reductions into budget prioritization and capital

improvement decisions when upgrading City facilities purchasing new vehicles, or engaging in other city operations and business.

The inventory measures three primary GHG emissions—carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O)—as defined in Chapter 2 of this Climate Action Plan. These greenhouse gases are then converted to carbon dioxide equivalents (CO_2e), enabling the City to consider different greenhouse gases in comparable terms. The conversion of greenhouse gases is done by comparing the global warming potential (GWP) of each gas to CO_2. For example, methane (CH_4) is 21 times more powerful than CO_2 on a per weight basis in its capacity to trap heat, and therefore one metric ton of CH_4 would be calculated as 21 metric tons of CO_2e, while nitrous oxide (N_2O) is 310 times more powerful than CO_2 and would be calculated as 310 metric tons of CO_2e.

FIGURE 3:COMMUNITY-WIDE INVENTORY ACTIVITIES



2007 COMMUNITY BASELINE INVENTORY RESULTS

Activities within the community created approximately 1,349,690 metric tons of carbon dioxide equivalents ($MTCO_2e$) in the baseline year 2007. As shown in **Table 1** and **Figure 4**, the transportation sector is the largest contributor at 51%, producing approximately 684,280 $MTCO_2e$ in 2007. Emissions from the residential energy sector are the next largest contributor, accounting for 19% of the total emissions, producing approximately 259,640 $MTCO_2e$. The non-residential energy sector accounted for 16% of the total emissions (209,880 $MTCO_2e$), and emissions from solid waste comprised 10% of the total (139,770 $MTCO_2e$). The electricity used to pump and treat water and wastewater, along with the direct methane emissions from wastewater treatment, accounted for 9,840 $MTCO_2e$, or about 1%, of community emissions. Emissions were also inventoried for off-road equipment and agriculture, making up 1% and less than 0.1% of total emissions, or 17,670 and 170 $MTCO_2e$, respectively.

Table 1 and **Figure 4** also include stationary or point source emissions. Stationary source emissions are defined as any fixed emitter of air pollutants, such as power plants, petroleum refineries, petrochemical plants, food processing plants, and other heavy industrial sources. The BAAQMD provided a list of stationary source emissions within the City of Santa Rosa totaling 28,440 $MTCO_2e$, or 2% of total community-wide emissions in 2007. Some of the common stationary source emitters in Santa Rosa include hospitals, colleges, City wastewater and transit facilities, wireless communication facilities, coffee roasters, and automotive repair shops.

Stationary source emissions are discussed in this inventory for informational purposes only, as stationary source emissions are influenced by market forces beyond the City's local influence and are instead best addressed and regulated by the BAAQMD or through federal and state programs. The baseline inventory is intended to guide future local policy decisions that relate to emissions within the City's influence; therefore, stationary source emissions are excluded from all further discussions of this inventory after **Table 1** and **Figure 4**.

Excluding stationary sources allows the City to identify accurate emissions reduction targets. With stationary sources removed from the inventory, Santa Rosa emitted approximately 1,321,240 metric tons of CO_2e in 2007. It is unknown whether or how stationary source emissions will change in the future; however, new potential emitters will be approved and noticed by the BAAQMD through current permitting processes.

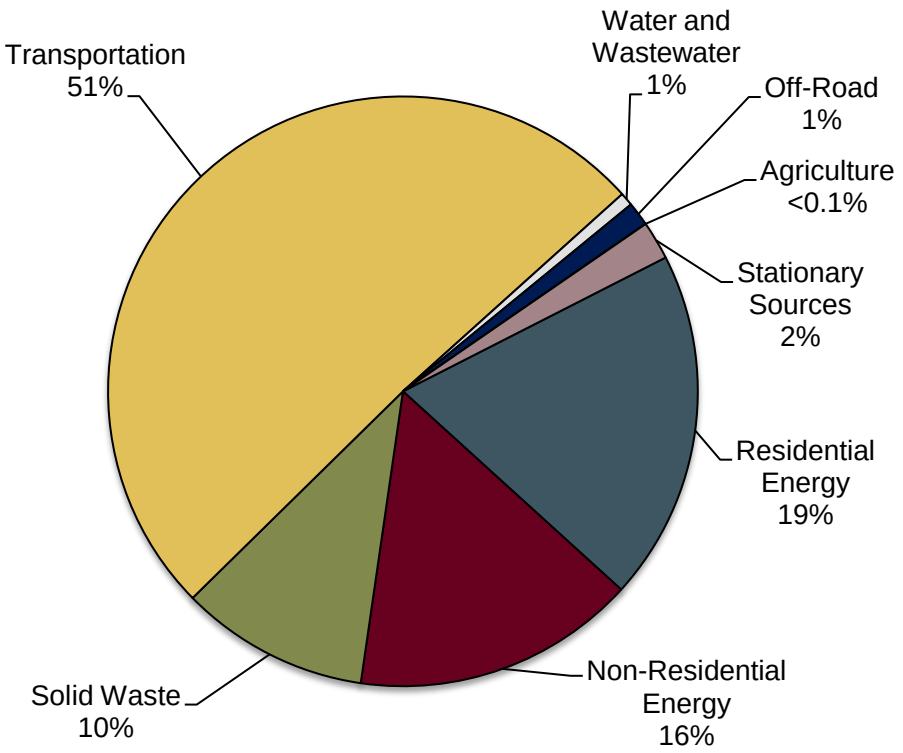
TABLE 1: 2007 COMMUNITY-WIDE BASELINE EMISSIONS BY SECTOR

Sector	Metric Tons CO_2e/year	Percentage of Total
Residential Energy	259,640	19%
Non-Residential Energy	209,880	16%
Solid Waste	139,770	10%

Sector	Metric Tons CO_2e/year	Percentage of Total
Transportation	684,280	51%
Water and Wastewater	9,840	1%
Off-Road	17,670	1%
Agriculture	170	<0.1%
Stationary Sources	28,440	2%
TOTAL*	**1,349,690**	**100%**

** Due to rounding, the total may not be the sum of component parts.*

FIGURE 4:2007 COMMUNITY-WIDE BASELINE EMISSIONS BY SECTOR



Additional details on the activities represented in the inventory are provided in **Table 2** below. **Table 2** also shows the distribution of emissions without stationary source emitters and summarizes the type of data collected, the activity data units, data sources, and GHG emissions for each sector and sub-sector.

TABLE 2: COMMUNITY-WIDE DATA ACTIVITIES AND SOURCES

Sector	Percentage of Total Emissions	Subsector	Activity	Source	$MTCO_2e$ per Year
Residential Energy	19%	Electricity	365,550 MWh	PG&E	106,920
		Natural Gas	28,386,390 Therms	PG&E	152,720
				Subtotal	259,640
Non-Residential Energy	16%	Electricity	469,670 MWh	PG&E	137,380
		Natural Gas	13,475,990 Therms	PG&E	72,500
				Subtotal	209,880
Solid Waste	10%	Landfilled Waste	176,850 Tons	SCWMA	136,060
		Alternative Daily Cover	7,830 Tons	SCWMA	3,710
				Subtotal	139,770
Transportation	51%	Daily Vehicle Miles Traveled	3,731,117 Miles	SCTA Model, Fehr & Peers	684,280
Water and Wastewater	1%	Water Supply Energy	70 MWh 0 Therms	SCWA, City	20
		Wastewater Treatment Energy	25,800 MWh 36,020 Therms	PG&E, City	7,750
		Wastewater Process Emissions	n/a	City	2,050
		Septic Tank Fugitive Emissions	n/a	City	20
				Subtotal	9,840
Off-Road	1%	Lawn and Garden	–	CARB	650
		Construction	–	CARB	17,020
				Subtotal	17,670
Agriculture	<1%	Off-Road Equipment	740 Acres of Agriculture	CARB	140
		Fertilizer		Ag Commissioner	30
				Subtotal	170
TOTAL*	**100%***				**1,321,250***

** Due to rounding, the total may not be the sum of component parts. This total does not include stationary sources because the City lacks primary control over many of these facilities as they are permitted and regulated by the Bay Area Air Quality Management District.*

GHG EMISSIONS FORECAST

A GHG emissions forecast is a prediction of how GHG emissions will change in the future with anticipated changes in population, commercial activity, and driving patterns. This GHG emissions forecast of community-wide emissions focuses on three target years: 2015, 2020, and 2035. The 2015 year is analyzed to determine whether the City can meet its adopted community-wide GHG reduction target of 25% below 1990 levels by 2015. The 2020 year is estimated for consistency with Assembly Bill 32 targets and BAAQMD guidelines, while 2035 is studied to create a parallel with the 2035 General Plan.

Business-As-Usual Forecast

A business-as-usual (BAU) projection is an estimate of how emissions would grow if consumption trends and efficiencies remain at their 2007 levels yet the number of people, households, and jobs continues to grow in Santa Rosa. In other words, it is the status quo scenario before state, regional, and local reduction efforts are taken into consideration. The business-as-usual projection utilizes the demographic projections from General Plan 2035 for commercial square footage, residential units, and population at buildout. General Plan buildout is the growth scenario under which land is developed to the maximum potential or theoretical capacity permitted by the proposed General Plan and its land use designations.

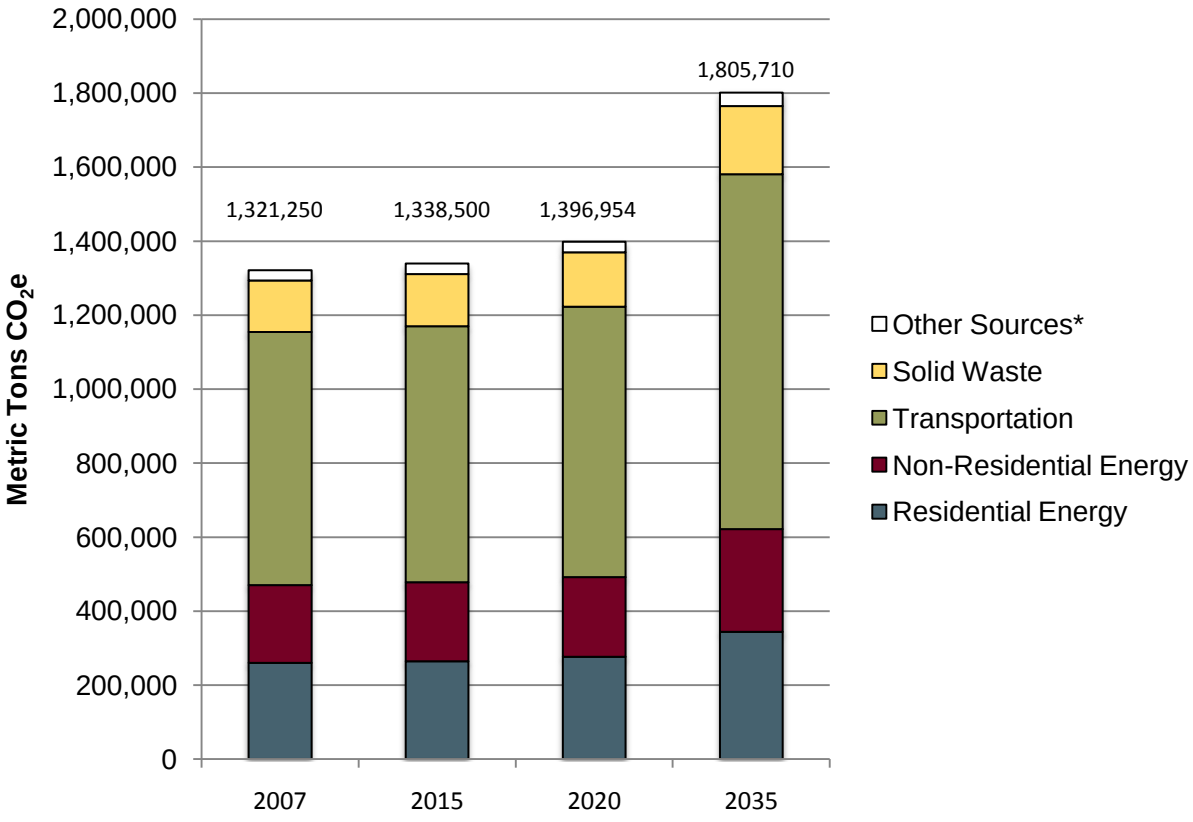
The General Plan buildout scenario analyzes growth in the City's Urban Growth Boundary by 2035. City staff provided interim-year growth projections for 2015 and 2020 based on recent trends and anticipated short-term growth in residential and commercial building permits and the City's Pending Development Report. Between 2007 and 2015, moderate residential and non-residential permitting is assumed. Between 2015 and 2020, increasing growth in both categories is assumed. Given the current economic downturn and its effect on development, the City anticipates that the majority of Santa Rosa's General Plan buildout growth will occur between 2020 and 2035. As shown in **Table 3** and **Figure 5**, emissions are anticipated to grow 1% from 2007 to 2015, 6% from 2007 to 2020, and 37% from 2007 to 2035.

TABLE 3: 2015, 2020, AND 2035 BUSINESS-AS-USUAL GHG FORECAST

Sector	2007 $MTCO_2e/Yr$	2015 $MTCO_2e/Yr$	2020 $MTCO_2e/Yr$	2035 $MTCO_2e/Yr$
Residential Energy	259,640	264,360	276,420	346,470
Non-Residential Energy	209,880	213,550	215,600	277,810
Solid Waste	139,770	141,340	146,860	185,340
Transportation	684,280	691,190	728,820	959,470
Water and Wastewater	9,840	9,950	10,340	13,040
Off-Road	17,670	17,990	18,810	23,580

Sector	2007 $MTCO_2e/Yr$	2015 $MTCO_2e/Yr$	2020 $MTCO_2e/Yr$	2035 $MTCO_2e/Yr$
Agriculture	170	120	90	0
TOTAL	**1,321,250**	**1,338,500**	**1,396,940**	**1,805,710**
Percentage Change from 2007	0%	1%	6%	37%

FIGURE 5:BUSINESS-AS-USUAL GHG FORECAST



** Other Sources include water and wastewater, agriculture, and off-road emissions representing less than 2% of the inventory.*

Emissions related to energy, water, wastewater, waste, and off-road equipment are anticipated to grow linearly with General Plan residential, commercial, and population growth. Agricultural activity is anticipated to be displaced beyond the Urban Growth Boundary as a result of future development. On-road vehicle miles traveled (VMT) in 2035 were modeled by Fehr & Peers transportation consultants using the 2035 Sonoma County Transportation Authority (SCTA) Travel Demand Model assuming no intervening VMT reduction measures. Fehr & Peers estimated 2015 and 2020 VMT forecasts by linearly interpolating between the 2007 base year results and the 2035 General Plan results using the interim-year projections modeled by City staff.

ADJUSTED FORECAST TO INCORPORATE EXISTING STATE & LOCAL PROGRAMS

The State of California has been proactive in reducing GHG emissions. Several regulations and efforts at the state level will lessen Santa Rosa's future GHG emissions, including vehicle standards, building standards, and the renewable energy content of electricity. The state actions summarized below are incorporated into the business-as-usual forecast to create a more realistic estimate of the City's future emissions. This adjusted forecast is detailed in **Table 4**.

California Building Code, Title 24

The calculation of CALGreen energy reductions assumes that all development between 2010 and 2035 will meet Title 24 2008 minimum efficiency standards. It also assumes that all growth in natural gas and electricity sectors is from new construction. Title 24 of the California Code of Regulations (CCR) mandates how each new home and business is built in California. It includes requirements for the structural, plumbing, electrical, and mechanical systems of buildings and for fire and life safety, energy conservation, green design, and accessibility in and about buildings. The 2010 triennial edition Title 24 pertains to all occupancies that applied for a building permit on or after January 1, 2011, and remains in effect until the effective date of the 2013 triennial edition. This Climate Action Plan focuses on two sections of Title 24: Part 6, the California Energy Code; and Part 11, the California Green Building Standards Code or CALGreen Code. These two sections require direct electricity, natural gas, and water savings for every new home or business built in California. Title 24 is a statewide standard applied at the local level by local agencies through project review.

Part 6, 2008 Building Energy Efficiency Standards

The most recent update to Title 24 Part 6, the California Energy Code, went into effect on January 1, 2010, for both residential and non-residential new construction. Part 6 also includes requirements for lighting and insulation upgrades to non-residential buildings undergoing a major retrofit.

Part 11, 2010 California Green Building Code

California is the first state in the nation to adopt a mandatory green building code, the California Green Building Standards Code, or CALGreen. The CALGreen Code was updated in 2010 and became a mandatory code beginning January 1, 2011. The code takes a holistic approach to green building by including minimum requirements in the areas of planning and design, energy efficiency, water efficiency and conservation, material conservation and resource efficiency, and environmental quality. All local governments must adopt the minimum requirements of the CALGreen Code and may elect to adopt one of the two additional tiers. Local governments can adopt a Tier 1 or Tier 2 standard in order to achieve greater energy, water, and health benefits.

Mandatory CALGreen standards do not require explicit reductions in energy consumption beyond the minimum Title 24 Part 6 standards. However, if a local government elects to adopt either of the tiers of CALGreen, additional prerequisites and electives must be implemented by new development projects subject to CALGreen. For the voluntary energy efficiency prerequisites, Tier 1

includes a 15% improvement and Tier 2 includes a 30% improvement over minimum Title 24 Part 6 requirements. The City of Santa Rosa has adopted the Tier 1 standards of CALGreen.

The GHG forecast in this Plan incorporates the net energy benefit of new Title 24 requirements that did not exist in the baseline year. These estimates are based on California Energy Commission studies that compare each new update of Title 24 to its former version. The AB 32 Scoping Plan calls for ongoing triennial updates to Title 24 that will yield regular increases in the mandatory energy and water savings for new construction. As such, the GHG forecast also includes a conservative estimate of the energy and water reductions due to future updates of Title 24 based on historic growth rates. The energy reductions quantified in the forecast from Part 6 Energy Code updates are based on the assumption that the triennial updates to the code will yield regular decreases in the maximum allowable amount of energy used from new construction.

Clean Car Fuel Standards (AB 1493, Pavley) – 2002

Signed into law in 2002, AB 1493 requires automobile makers to reduce GHG emissions from new passenger cars and light trucks beginning in 2011. Regulations were adopted by the California Air Resources Board (CARB) in 2004 and took effect in 2009 when the U.S. Environmental Protection Agency (EPA) issued a waiver confirming California's right to implement the bill. CARB anticipates that the Pavley standards will reduce GHG emissions from new California passenger vehicles by about 22% in 2012 and about 30% in 2016, while simultaneously improving fuel efficiency and reducing motorists' costs.[6]

Renewable Portfolio Standard (RPS)

California's Renewable Portfolio Standard (RPS) is one of the most ambitious renewable energy standards in the country, mandating that 33% of electricity delivered in California is generated by renewable sources like solar, wind, and geothermal by 2020. The California RPS was first codified in 2002 by Senate Bill 1078 (requiring 20% renewable electricity mix by 2010) and further strengthened in April 2011 with the adoption of Senate Bill X 1-2 (requiring 33% renewable electricity mix by 2020).[7] The RPS intends to boost the economy and establish California as a center for the development and use of renewable energy. Only Hawaii's electricity standard of 40% renewable by 2030 trumps California renewable energy standards.

Despite the 2020 goal of California's RPS, technological and political challenges may prevent some investor-owned utilities from meeting the 33% target by 2020. In 2010, the California Public Utilities Commission reported that 18% of California's electricity came from renewable sources, missing the 20% goal by 2%. California utilities have more than enough renewable electricity under consideration to meet the 33% target by 2020. However, due to contract and transmission limitations, not all of this new electricity will be available in time to meet the goals.[8] Taking these issues into account, this document assumes a more conservative forecast of a 28% renewable mix by 2020.

[6] California Air Resources Board 2010a.
[7] California Public Utilities Commission 2011.
[8] California Public Utilities Commission 2011.

As shown in **Table 4**, state reduction efforts are anticipated to reduce business-as-usual emissions by 84,400 $MTCO_2e$ in 2015, 161,670 $MTCO_2e$ in 2020, and 387,040 $MTCO_2e$ in 2035. The majority of these reductions are from the AB 1493 (Pavley) standards and PG&E's renewable energy portfolio. In comparison to the business-as-usual scenario, 2020 emissions with state reduction measures are 6% below baseline 2007 levels rather than 6% above 2007 levels. Similarly, 2035 emissions go from 36% above baseline 2007 levels in the business-as-usual scenario to only 7% above baseline levels after state efforts are taken into account.

TABLE 4: SUMMARY OF GHG FORECAST ADJUSTED FOR STATE ACTIONS

	2007	2015	2020	2035
Business-As-Usual Emissions	1,321,250	1,338,500	1,396,940	1,805,710
Renewable Portfolio Standard (RPS)	–	-26,700	-43,640	-95,680
AB 1493 (Pavley) Vehicle Standards	–	-49,780	-101,830	-220,760
CALGreen Building Standards	–	-7,920	-16,290	-70,600
Subtotal State Reduction Efforts	–	-84,400	-161,760	-387,040
Net Emissions	1,321,250	1,254,100	1,235,180	1,418,670
Percentage Change from 2007 Levels	0%	-5%	-6%	7%

BASELINE MUNICIPAL EMISSIONS & FORECAST

A municipal operations inventory includes all emissions sources owned, operated, and/or under the influence of a city government such as fleet vehicles, water and wastewater facilities, buildings, and employee commute. Government emissions are a small part of the overall community-wide emissions in the non-residential energy, transportation, water, and waste emissions categories.

An inventory of municipal operations was completed as part of the City of Santa Rosa Greenhouse Gas Reduction Action Plan Analysis prepared under the direction of the Climate Protection Campaign and funded by the California Public Utilities Commission. The analysis studies the baseline year of 2000. Since the baseline year for City government operations is different from the 2007 baseline for community-wide emissions, the two cannot be directly compared or overlapped. To address this discrepancy, and to create a common baseline against which municipal and community-wide emissions can be measured and the City's progress in attaining reduction goals can be tracked, a new municipal inventory was prepared for a baseline year of 2007.

The 2007 baseline municipal GHG inventory includes GHG emissions from the operations and activities conducted by the City of Santa Rosa. GHG emissions were calculated based on data collected by the City and consistent with best practices and methodologies recommended by the California Air Resources Board through the Local Government Operations Protocol, version 1.1 (LGOP, v 1.1). The City's Qualified GHG Reduction Strategy tracks the measures affecting City

government operations and community-wide emissions separately and compares reductions to the 2007 baseline inventories.

The Inventory analyzes the following activities and emissions sources:

- Buildings and Facilities[9]
- Equipment
- Fleet
- Public Lighting
- Water Operations
- Employee Commute
- Waste Disposal
- Wastewater Operations

This analysis determined that in 2007, operations and activities by the City of Santa Rosa resulted in approximately 27,820 $MTCO_2e$. **Table 5** and **Figure 6** depict the contribution of each activity to the total GHG emissions from municipal operations in 2007. Wastewater operations and the City's fleet make up the majority of the city's emissions, with wastewater producing 13,600 $MTCO_2e$ and the fleet resulting in 8,510 $MTCO_2e$. Buildings and facilities make up 12% of total municipal emissions, which are followed closely by employee commute and public lighting, contributing 9% and 8% respectively. The remaining sectors, water operations, waste, and equipment, make up the remaining 7% of total GHG emissions. The activity data collected, the emissions factors used to convert activity data into $MTCO_2e$, and the sources of information for each sector of the municipal operations inventory are presented in more detail in **Appendix A.**

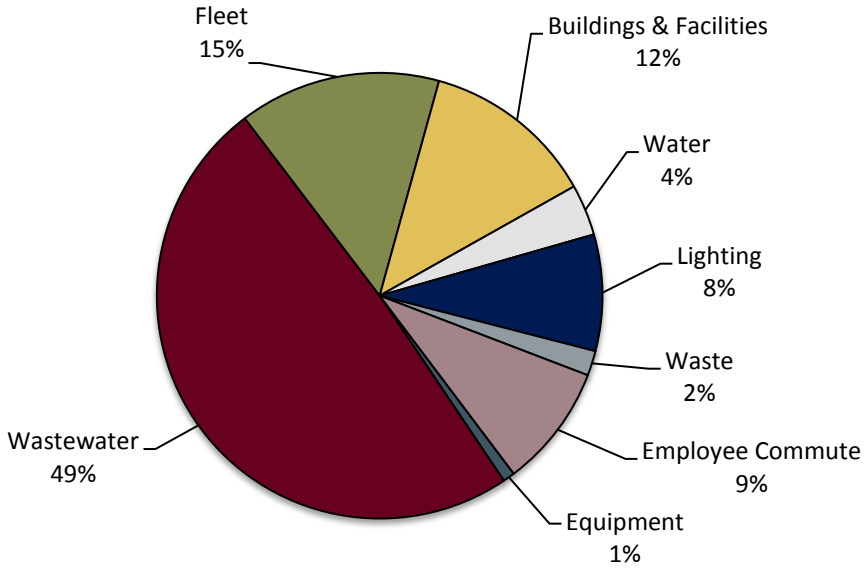
TABLE 5: MUNICIPAL OPERATIONS INVENTORY, 2007

Sector	Activity Type	Activity Data	$MTCO_2e$	Total $MTCO_2e$
Buildings & Facilities	Electricity	7,443,900	2,160	3,480
	Natural Gas	248,100	1,320	
Equipment	CNG	330	0	340
	Diesel	14,070	140	
	Electric	30	0	
	Gasoline	21,360	190	
	Propane	620	0	

[9] Refrigerants from facility HVAC equipment were not analyzed as part of this assessment as directed by the Local Government Operations Protocol. R-22, the refrigerant used at City facilities is a GHG that is being phased out of use under the Kyoto Protocol and therefore is not recommended for inclusion in the City's baseline inventory.

Sector	Activity Type	Activity Data	$MTCO_2e$	Total $MTCO_2e$
Fleet	CNG	10,450	60	4,060
	Diesel	283,980	2,900	
	Electric	0	0	
	Gasoline	121,510	1,080	
	Propane	3,170	20	
Public Lighting	Streetlights	6,823,000	1,980	2,340
	Traffic Lights	757,300	220	
	Other Lighting	479,100	140	
Water Operations	Irrigation Controls	88,050	30	1,030
	Water Operations	3,448,740	1,000	
Employee Commute	Annual Employee VMT	5,557,600	2,470	2,470
Waste	Tons Disposed	720	500	500
Wastewater Operations	Direct Process Emissions	2,050	2,050	13,600
	Electricity	23,990,200	6,910	
	Natural Gas	871,900	4,640	
			TOTAL	**27,820**

FIGURE 6:MUNICIPAL OPERATIONS INVENTORY, 2007



City government operations are estimated to be approximately 2% of Santa Rosa's total community-wide emissions (see **Figure 7**). The vast majority of emissions from City government operations are included in the community-wide total. There are some instances where City-owned or -operated facilities or equipment are outside of the City's Urban Growth Boundary and are not captured in the community-wide inventory. The relationship of the community-wide and City government inventories is shown in **Figure 8**.

FIGURE 7:MUNICIPAL OPERATIONS COMPARED TO COMMUNITY GHG EMISSIONS

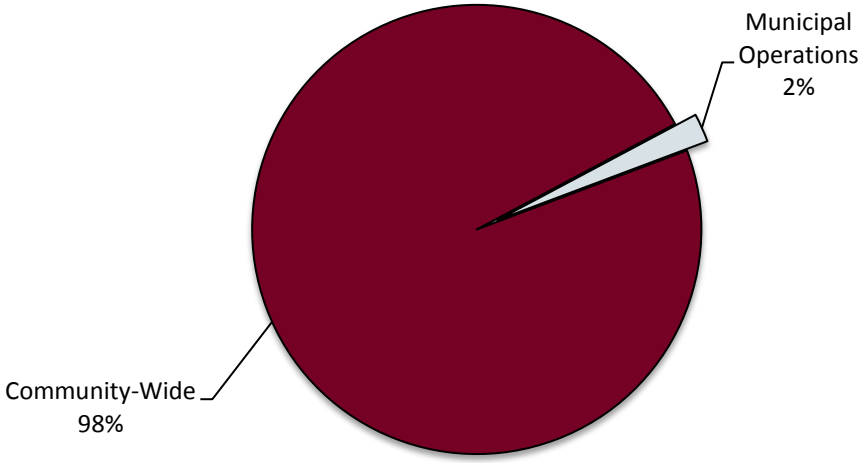
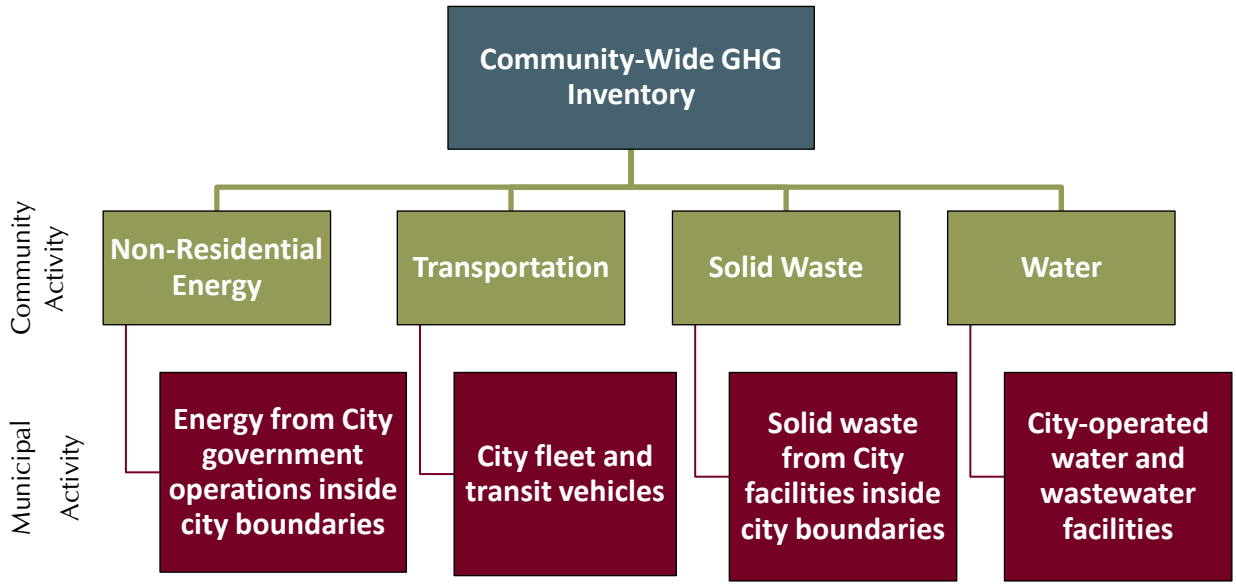


FIGURE 8: RELATIONSHIP OF MUNICIPAL AND COMMUNITY-WIDE INVENTORIES



In 2005, the City adopted a GHG reduction target to reduce municipal operations emissions 20% below 2000 emissions levels by 2010. To determine whether the City has achieved the adopted GHG reduction target, an assessment of both 2000 and 2010 emissions was completed. The results of the assessment show that each sector's change in GHG emissions occurred at a different rate and that some sectors have seen a decrease in GHG emissions while others have increased. **Table 6** and **Figure 9** show how each sector has increased or decreased between 2000 and 2010. Overall, the City's municipal GHG emissions have increased approximately 1% between 2000 and 2010, though they have decreased slightly between 2007 and 2010.

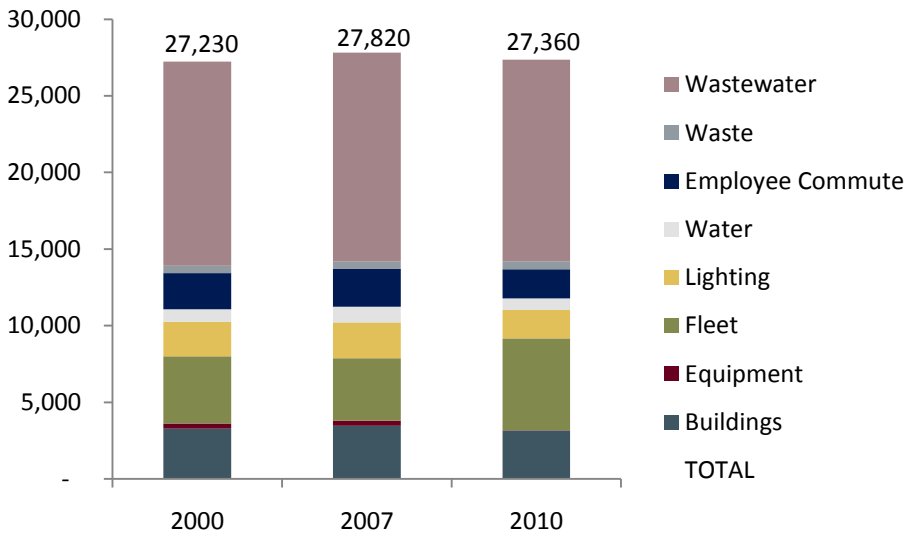
TABLE 6: MUNICIPAL OPERATIONS INVENTORY, 2000–2010 ($MTCO_2e$)

Sector	2000	2007	2010	% Change
Buildings*	3,290	3,480	3,150	-4%
Equipment	320	340	40	-82%
Fleet	4,390	4,060	5,980	36%
Lighting*	2,260	2,340	1,860	-18%
Water*	820	1,030	750	-9%
Employee	2,350	2,470	1,910	-19%

Sector	2000	2007	2010	% Change
Commute				
Waste	480	500	510	6%
Wastewater*	13,320	13,600	13,160	-1%
TOTAL	**27,230**	**27,820**	**27,360**	**1%**

**Sectors with electricity or natural gas use are based on 2003 information rather than 2000 as 2003 is the earliest year PG&E could provide data. Estimated emissions factors for electricity in 2000 were applied to the 2003 electricity data.*

FIGURE 9:2000, 2007, AND 2010 MUNICIPAL GHG EMISSIONS BY SECTOR ($MTCO_2E$)



GHG REDUCTION TARGETS

The BAAQMD CEQA Guidelines require local governments to establish a GHG reduction target for 2020 and for the target year of the document, which in Santa Rosa's case is the anticipated General Plan buildout year of 2035.

Locally Adopted GHG Reduction Targets

In August 2005, the City adopted two GHG reduction targets for 2010 and 2015 via Council Resolution Number 26341. The resolution set a greenhouse gas emission reduction target for City government operations of 20% from 2000 levels by 2010.

Resolution 26341 also set a community-wide greenhouse gas emission reduction target of 25% from 1990 levels by 2015. According to the California Air Resources Board, 1990 emissions were approximately 15% lower than 2007 levels. A reduction target of 25% below 1990 levels would therefore be equivalent to an approximate 37% reduction below 2007 baseline levels.

State-Recommended 2020 and 2035 Reduction Targets

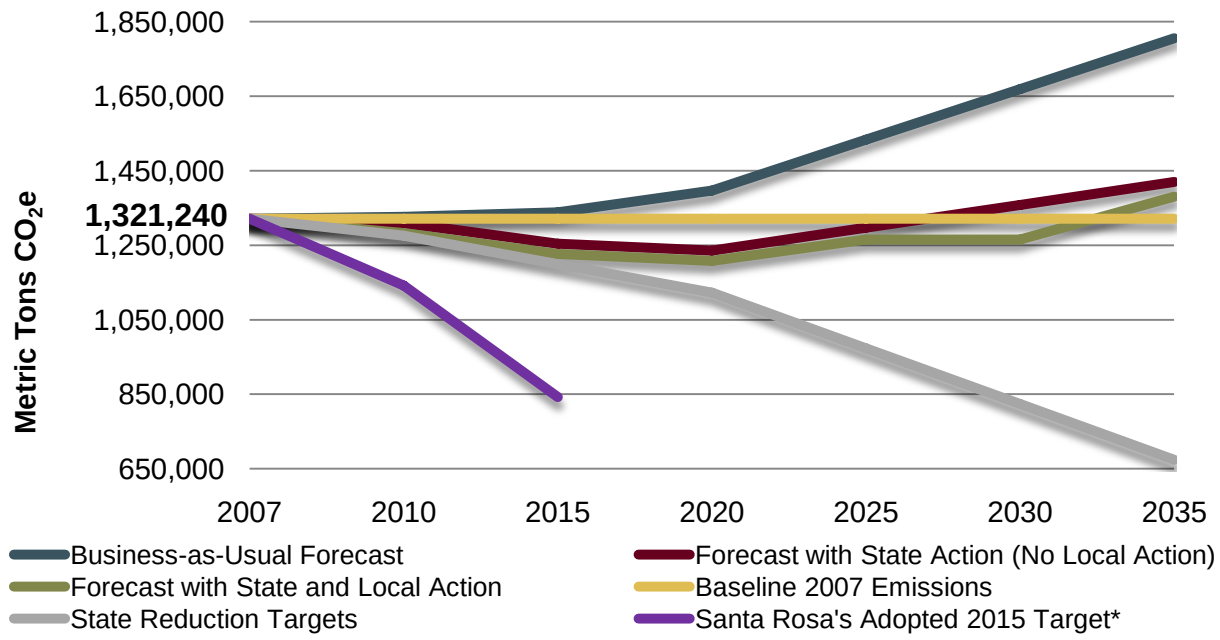
AB 32 calls for statewide GHG emissions to return to 1990 levels by 2020. The AB 32 Scoping Plan identifies local governments as "essential partners" in achieving this target and identifies 15% below current (2005–2008) levels as the local government equivalent of 1990 GHG emissions levels. The City will need to facilitate a 7% reduction in community-wide emissions to meet the AB 32 Scoping Plan goal of 15% below 2007 levels by 2020.

The State has not formally adopted GHG reduction targets for any year past 2020; however, in 2005, Governor Schwarzenegger signed Executive Order S-3-05, which created a goal to reduce GHG emissions to 1990 levels by 2020 and to 80% below 1990 levels by 2050. To be on a trajectory toward the Executive Order S-3-05 target for 2050, the City would need to reduce community-wide emissions by 51% by 2035.

SANTA ROSA GHG EMISSIONS & STATE REDUCTION TARGETS

Figure 10 shows the City's GHG reduction forecasts in relation to baseline and state reduction targets. The City's adopted 2015 goal is shown in blue. As shown, the City's 2015 goal is unlikely to be attained based on existing state and local GHG reduction efforts.

FIGURE 10: SANTA ROSA GHG FORECAST AND REDUCTION TARGETS



** Santa Rosa adopted a GHG reduction target of 25% below 1990 levels by 2015, a level estimated to be 37% below 2007 baseline levels through Council Resolution Number 26341.*

CHAPTER 4 –
GHG REDUCTION STRATEGIES

City of Santa Rosa
Community Development

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4. GHG REDUCTION STRATEGIES

The reduction measures included in this Plan are a diverse mix of regulatory and incentive-based programs for both new and existing development. The reduction measures also aim to reduce GHG emissions from each source to avoid reliance on any one strategy or sector to achieve the target. The following chapter describes the process for developing, refining, and quantifying the GHG reduction goals, strategies, and actions identified to achieve the City's GHG reduction targets.

REDUCTION STRATEGY STRUCTURE

In order to achieve the state-recommended reduction target of 15% below 2007 emissions levels by 2020 and the locally adopted reduction target of 25% below 1990 levels, the City of Santa Rosa will need to implement the goals, policies, and actions set forth in this chapter. The City's strategy is structured around the following nine topic areas:

1. Energy Efficiency and Conservation
2. Renewable Energy
3. Parking and Land Use Management
4. Improved Transport Options
5. Optimized Vehicular Travel
6. Waste Reduction, Recycling, and Composting
7. Water and Wastewater
8. Agriculture and Local Food
9. Off-Road Vehicles and Equipment

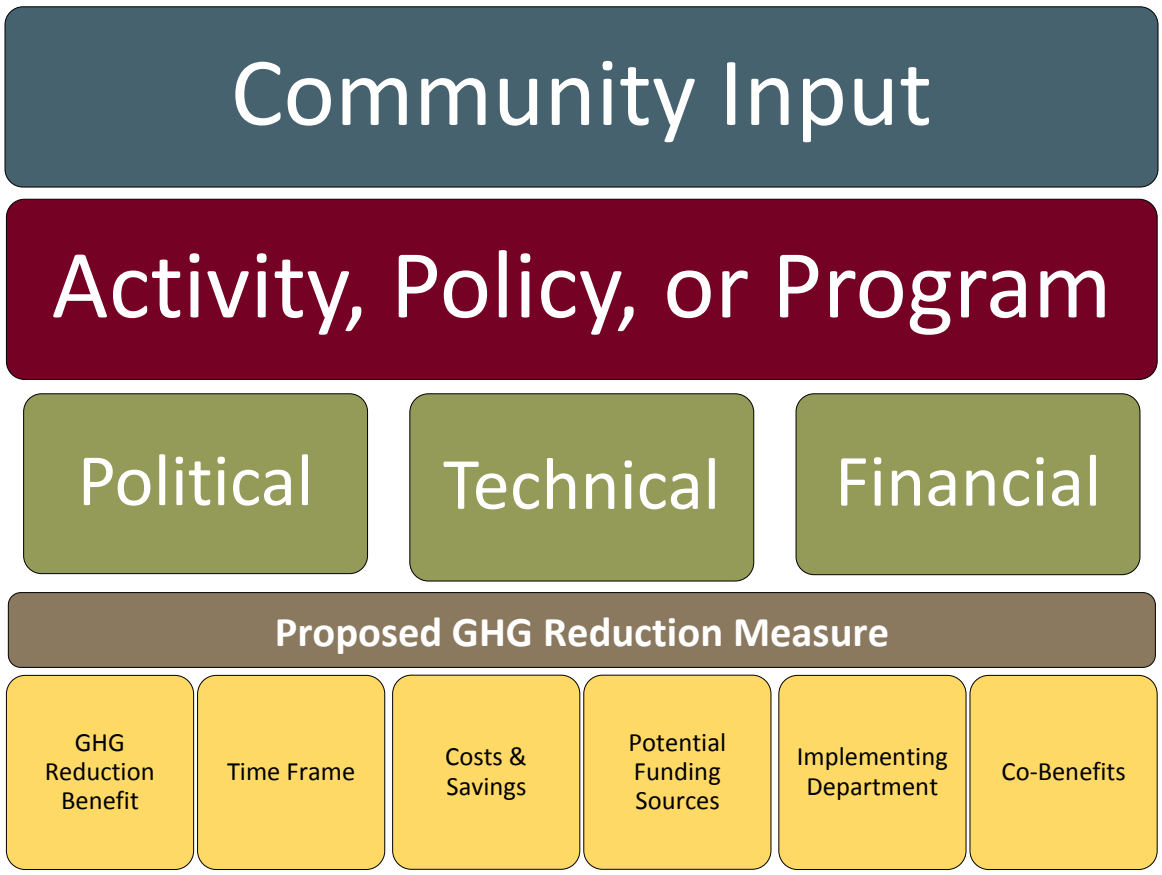
Each topic area has a corresponding goal, reduction measures, and supporting actions necessary for implementation.

While many of the reduction measures and actions will result in further reductions in emissions from municipal operations, the City has initiated a separate, more detailed reduction strategy for municipal operations that will identify operational changes, capital projects, and equipment or vehicle upgrades necessary to create the desired emission reductions.

GHG REDUCTION MEASURE DEVELOPMENT AND METHODOLOGY

The process for developing GHG reduction measures includes a review of existing policies, activities, and programs, identification of topic areas or goals, and preliminary reduction measure language with performance targets and indicators. These preliminary measures are then refined through the community engagement process and are evaluated for political, technical, and financial feasibility (see **Figure 11**). The final piece to developing each GHG reduction measure is the identification of how each policy will be successfully implemented by determining the GHG reduction benefit, the time frame for implementation, the estimated costs and savings to the community and the City, potential sources of funding, the department responsible for implementation, and the additional benefits, or co-benefits, that may occur from implementation of each measure.

FIGURE 11: GHG REDUCTION MEASURE DEVELOPMENT PROCESS

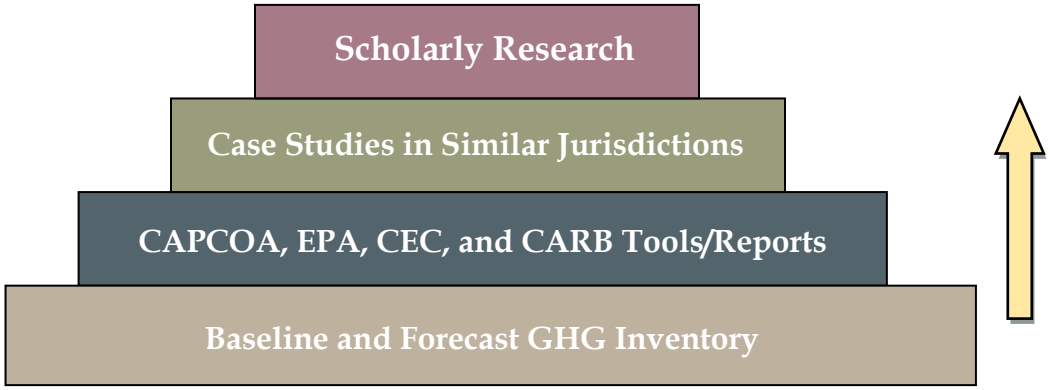


The GHG Reduction Benefit of each measure is determined by a change in operation, activity, or efficiency. In general, there are three types of reductions in climate action plans: (1) avoided emissions, (2) greater efficiency, and (3) sequestration. GHG reduction estimates are identified for 2015, 2020, and 2035.

The information used to estimate GHG emissions reductions is summarized in **Figure 12.** The baseline GHG inventory and forecast serve as the foundation for quantifying the City's GHG reduction measures. Activity data from the inventory, e.g., vehicle miles traveled and kilowatt-hours (kWh) of electricity, is combined with the performance targets and indicators identified in this Plan to calculate the GHG reduction benefit of each measure. This approach ensures that the City's GHG reductions are tied to the baseline and future activities that are actually occurring in Santa Rosa.

Whenever possible, emissions reduction estimates are based on tools and reports provided by government agencies such as the US Environmental Protection Agency (EPA), California EPA, California Energy Commission (CEC), California Air Resources Board (CARB), California Air Pollution Control Officers Association (CAPCOA), and local air districts. If accurate reduction estimates are not available through these tools, a case study may be used if the case study is comparable to the conditions in the city. Finally, for more long-range reduction measures that lack actual on-the-ground testing or analysis, current scholarly and peer-reviewed research is combined with knowledge of existing city practices to create a defensible estimate of future emissions reductions.

FIGURE 12: GHG QUANTIFICATION SOURCES AND TOOLS



To demonstrate the types of information and performance indicators that go into quantifying each measure, a detailed example calculation is provided below in **Table 7.**

TABLE 7: EXAMPLE MEASURE QUANTIFICATION

Example Measure: Implement residential energy efficiency program.			
	Quantification Data	**Year: 2020**	**Data Source**
A	Total residential electricity use (kWh)	600,000,000	Example GHG Inventory Forecast
B	Total households	100,000	US Census Data
C	Average electricity use per household	6,000	Calculation = A/B
D	Percentage of households participating in program	5%	Measure goal
E	Total households participating in program	5,000	Calculation = B*D
F	Average electricity savings per participant	5%	Case studies from cities A and B
G	Total electricity savings	1,500,000	Calculation = C*E*F
H	Metric ton of CO_2e per kWh	0.0002	Example City GHG Inventory
I	Emissions reduction ($MTCO_2e$)	300	Calculation = G*H

The methodology for determining the GHG reduction benefit from each measure is detailed in the GHG Technical **Appendix B,** which summarizes the sources and assumptions used to estimate the GHG reductions from each measure.

EVALUATION CRITERIA

In order to ensure successful implementation and evaluation of the GHG reduction measures included in this Climate Action Plan, the following criteria have been identified in this Plan or the associated implementation matrix:

- Implementation Time Frame
- Cost to the City
- Cost to the Community
- Potential Funding Sources
- Implementing Department
- Supporting Agencies
- Community Co-Benefits

Implementation Time Frame will be identified for each measure based on community priorities, local goals, and the availability of technological innovations to implement each measure. Time frames will be presented as a range similar to the following:

Time Frame	Year Range
Ongoing	Existing effort that will continue to be implemented
Near-Term	Implemented between 2011 and 2015
Mid-Term	Implemented no later than 2020
Long-Term	Implemented by 2035

Cost to the City estimates incorporate the public cost of new infrastructure, services, or programs. For some types of measures, particularly land use measures, it may not be possible to calculate all cost components within the scope of the Climate Action Plan. Strategies for which a cost estimate cannot be provided are noted. These cost estimates are provided as a range or scale to emphasize the estimated nature of this indicator and allow for cross-sector comparisons.

Cost to the Community are included when applicable. This analysis identifies the added costs for purchasing or incorporating more expensive, energy-saving materials and technology such as hybrid or electric vehicles, equipment to reduce or monitor energy use, and renewable energy installations. It is anticipated that any added costs identified in this analysis should be offset through future energy, fuel, water, or other savings, providing monetary savings that outweigh the added upfront costs. These cost estimates are provided as a range or scale to emphasize the estimated nature of this indicator and allow for cross-sector comparisons.

The following cost ranges are utilized for both the costs to the City and the community:

Costs ($)	Range
0	Minimal
1–25,000	Low
25,001–100,000	Low-Mid
100,001–200,000	Medium
200,001–500,000	Medium-High
Over 500,000	High

Estimated costs to the City and community are summarized for each measure in **Appendix C**.

Potential Funding Sources are identified whenever possible. Due to the short-term nature of many funding sources, this indicator is flexible and will be updated as necessary to incorporate new funding opportunities and changing economic opportunities. Opportunities for funding GHG reduction measures may include grant opportunities, financing mechanisms, low-interest loans, or rebates and incentives. Potential funding sources are summarized for each reduction measure in **Appendix C**.

Implementing Department will identify the City department that will be responsible for implementing each measure, securing funding resources, reporting on annual progress, and coordinating with the supporting agencies.

Supporting Agencies are the public and private local and regional entities that will be a partner or lead in the implementation of certain actions. Examples of supporting agencies to the City of Santa Rosa include the Regional Climate Protection Agency, Sonoma County Waste Management Agency, PG&E, or the Santa Rosa Chamber of Commerce.

Community Co-Benefits will be included to identify the ancillary benefits that each measure may have for the community. These benefits will be noted throughout the CAP with icons as shown below.



Conserves Energy | Improves Air Quality | Improves Public Health | Supports Local Economy | Reduces Water Use | Provides Educational Opportunities | Provides Monetary Savings | Implements State Policy | Improves Mobility

Measure Implementation. Some measures require subsequent City action, such as evaluation of rebates, coordination with other entities, or adoption of an ordinance, to fully implement them. Measures requiring code amendments or future approval will not be in effect until this subsequent action is taken.

GHG REDUCTION STRATEGIES

GOAL 1: ENERGY EFFICIENCY AND CONSERVATION

Facilitate energy efficiency and conservation through behavior changes and retrofits.

Measure 1.1: CALGreen Requirements for New Construction

Continue to enforce and require new development to meet Tier 1 CALGreen requirements, as amended, for new non-residential and residential development.

2015 GHG Reduction

Calculation included in existing activities

2020 GHG Reduction

Calculation included in existing activities

2035 GHG Reduction

Calculation included in existing activities

Responsible Department(s)

Community Development

Co-Benefits



Action Items:

- Action 1.1.1. Require new development to comply with the current provisions, as amended, of CALGreen, Part 11 of the California Green Building Standards Code.
- Action 1.1.2 Continue to require Tier 1 standards for new development and consider adding major remodels during the next building code update.
- Action 1.1.3. Require all new construction to be built with net zero electricity use, beginning in 2020.
- Action 1.1.4. Evaluate potential incentives for projects that have net zero electricity use, prior to 2020.

Measure 1.2: Energy Efficiency in Existing Buildings

Facilitate energy efficiency upgrades and retrofits in existing commercial, residential, and industrial buildings by connecting residents and businesses with technical and financial assistance.

2015 GHG Reduction

-20,140 $MTCO_2e/yr$

2020 GHG Reduction

-103,390 $MTCO_2e/yr$

2035 GHG Reduction

-112,870 $MTCO_2e/yr$

Responsible Department(s)

Community Development, Economic Development & Housing

Co-Benefits



Action Items:

- Action 1.2.1. Connect businesses and residents with voluntary programs that provide free or low-cost energy efficiency audits and financing assistance for energy-efficient appliances.
- Action 1.2.2. Work with the Sonoma County Energy Independence Program (SCEIP) to offer low-interest financing and technical assistance to property owners for energy efficiency retrofits.
- Action 1.2.3. Create a renter's energy efficiency informational brochure or website.
- Action 1.2.4. Create a retrofit brochure or website specific to historic structures utilizing the EPA *Sustainable Solutions for Historic Houses in Northern California* guidelines to ensure sensitive retrofit of older buildings.
- Action 1.2.5. Seek funding to expand the retrofit of affordable housing units.
- Action 1.2.6. Utilize Hot Spot Maps (RCPA) to identify neighborhoods that may be prioritized for a retrofit pilot program.
- Action 1.2.7. Develop a City Energy project to reduce energy in all City facilities through lighting retrofits (indoors and in parking lots and streetlights) and mechanical system upgrades to chillers, boilers, pumps, motors, HVAC, and energy management software.
- Action 1.2.8. Coordinate with local school districts and Santa Rosa Junior College to facilitate energy and GHG reductions at educational facilities within Santa Rosa.
- Action 1.2.9. Continue to identify, implement, and monitor additional methods for reducing energy use from existing residential and non-residential properties to achieve the county-wide goal of retrofitting 80% of existing buildings. Utilize voluntary programs such as SCEIP, rebate programs, energy rating systems, and energy-efficient mortgages. Monitor progress annually to determine if other retrofit programs are necessary to achieve reduction goals.

Measure 1.3: Smart Meter Utilization

Encourage existing development and require new development to utilize PG&E's Smart Meter system to facilitate energy and cost savings.

2015 GHG Reduction

-3,900 $MTCO_2e/yr$

2020 GHG Reduction

-7,650 $MTCO_2e/yr$

2035 GHG Reduction

-12,920 $MTCO_2e/yr$

Responsible Department(s)

Community Development, Utilities (for water-using appliances only) and a general fund department, as appropriate

Co-Benefits



Action Items:

- Action 1.3.1. Require new construction and major remodels to install real-time energy monitors that allow building users to track their current energy use.
- Action 1.3.2. Inform the community of metering options, such as online applications and in-home monitors.
- Action 1.3.3. Connect businesses and residents with rebate programs that give priority to appliances with smart grid technology.

Measure 1.4: Tree Planting and Urban Forestry

Plant and maintain trees on private property, streets, and open space areas.

2015 GHG Reduction

-750 $MTCO_2e/yr$

2020 GHG Reduction

-1,640 $MTCO_2e/yr$

2035 GHG Reduction

-5,220 $MTCO_2e/yr$

Responsible Department(s)

Community Development, Recreation, Parks & Community Services, IT

Co-Benefits



Action Items:

- Action 1.4.1. Develop a tree inventory that identifies the types, ages, number, and location of trees in Santa Rosa.
- Action 1.4.2. Implement the City's tree preservation ordinance.
- Action 1.4.3. Require new development to supply an adequate number of street trees and private trees.
- Action 1.4.4. Create an Urban Greening Policy.
- Action 1.4.5. Develop a crowd-sourced web application allowing the community to enter information about public and private trees into a citywide database.

Measure 1.5: Cool Roofs and Pavements

Require new sidewalks, crosswalks, and parking lots to be made of cool paving materials with a high solar reflectivity.

2015 GHG Reduction

-110 $MTCO_2e/yr$

2020 GHG Reduction

-250 $MTCO_2e/yr$

2035 GHG Reduction

-650 $MTCO_2e/yr$

Responsible Department(s)

Transportation & Public Works

Co-Benefits



Action Items:

- Action 1.5.1. Adopt an ordinance that requires and specifies cool paving materials for new parking lots, sidewalks, roofs, and crosswalks and integrates Low Impact Development guidelines for new construction and Capital Improvement Projects.
- Action 1.5.2. Ensure the cool roof and paving ordinance includes cool roof specifications which allow for green or living roofs and address energy installations on historic structures consistent with the Secretary of Interior's Rehabilitation Standards. Allow darker-color roofs when they meet cool roof standards.
- Action 1.5.3. Create a pilot program for a Green Streets Policy.

Measure 1.6: Energy-Efficient Appliances

Facilitate the efficient use of energy for appliances in residential, commercial, and industrial buildings.

2015 GHG Reduction

-410 $MTCO_2e/yr$

2020 GHG Reduction

-520 $MTCO_2e/yr$

2035 GHG Reduction

-860 $MTCO_2e/yr$

Responsible Department(s)

Utilities (for water-using appliances only) and a general fund department, as appropriate

Co-Benefits



Action Items:

- Action 1.6.1. Seek funding sources to develop a rebate program for residents and businesses to exchange inefficient appliances with Energy Star certified models.

Measure 1.7: Appliance Electrification

Encourage residents and businesses to switch natural-gas-powered appliances to electric power, where appropriate.

Action Items:

- Action 1.7.1. Utilize the energy-efficient appliance rebate program to facilitate the replacement of natural gas equipment with electric-powered equipment.
- Action 1.7.2. Identify opportunities to implement additional programs that will switch appliances from natural gas to electricity.

2015 GHG Reduction

-750 $MTCO_2e/yr$

2020 GHG Reduction

-4,240 $MTCO_2e/yr$

2035 GHG Reduction

-9,820 $MTCO_2e/yr$

Responsible Department(s)

Utilities (for water-using appliances only) and a general fund department, as appropriate

Co-Benefits



GOAL 2: RENEWABLE ENERGY

Install and utilize renewable energy sources in Santa Rosa.

Measure 2.1: Small-Scale Renewable Energy Installations

Support the installation of small-scale renewable energy systems including solar photovoltaic, solar thermal, wind, and others.

Action Items:

- Action 2.1.1. Update the Zoning Code to define a renewable energy strategy that removes any barriers to small-scale renewable energy systems.
- Action 2.1.2. Implement a Solar Policy. Revise the permit processes and fees as appropriate to remove barriers to and incentivize the installation of renewable energy systems in accordance with applicable safety and

2015 GHG Reduction

Supportive Measure

2020 GHG Reduction

Supportive Measure

2035 GHG Reduction

Supportive Measure

Responsible Department(s)

Community Development

Co-Benefits



environmental standards.

- Action 2.1.3. Consider requiring new homes and businesses to be pre-wired and pre-plumbed for solar, wind, solar thermal installations, and electric vehicle charging stations.
- Action 2.1.4. Create and prioritize municipal projects that incorporate or generate renewable energy.

Measure 2.2: Renewable Energy Financing

Connect property owners with low-interest financing opportunities for renewable energy installations.

2015 GHG Reduction
-8,200 $MTCO_2e/yr$
2020 GHG Reduction
-20,790 $MTCO_2e/yr$
2035 GHG Reduction
-27,280 $MTCO_2e/yr$

Responsible Department(s)
Community Development

Co-Benefits



Action Items:

- Action 2.2.1. Continue to partner with SCEIP to provide Property Assessed Clean Energy (PACE) or equivalent financing for solar installations.
- Action 2.2.2. Explore and advocate for a regional or statewide Feed-In Tariff (FIT) to spur the installation of mid-sized renewable energy installations.

Measure 2.3: Renewable Power Generation

Establish a comprehensive renewable energy program that would allow the Santa Rosa community to generate or receive electricity where a minimum of 50% comes from renewable energy sources by 2020 and 70% by 2035.

2015 GHG Reduction
-22,180 $MTCO_2e/yr$
2020 GHG Reduction
-56,040 $MTCO_2e/yr$
2035 GHG Reduction
-58,240 $MTCO_2e/yr$

Responsible Department(s)
Utilities

Co-Benefits



Action Items:

- Action 2.3.1. Set the renewable power generation goal via Council resolution for the City to increase community-wide energy generation as described above.
- Action 2.3.2. Work with PG&E to reduce GHG emissions from energy use through an increase in the renewable portfolio for the residents and businesses in Santa Rosa.

- Action 2.3.3. Collaborate with neighboring jurisdictions and Sonoma County to explore the feasibility and cost of a Community Choice Aggregation program.

- Action 2.3.4. Evaluate opportunities to modify the Zoning Code and ensure mid-size (up to 5 MW) renewable energy development projects are allowed in appropriate locations with a clear and streamlined approval process.

GOAL 3: PARKING AND LAND USE MANAGEMENT

Reduce vehicle miles traveled by managing the parking supply and facilitating efficient land uses.

2015 GHG Reduction

-5,450 $MTCO_2e/yr$

2020 GHG Reduction

-11,680 $MTCO_2e/yr$

2035 GHG Reduction

-10,780 $MTCO_2e/yr$

Responsible Department(s)

Community Development

Co-Benefits



Measure 3.1: Density

Increase the jobs and housing density in Santa Rosa's downtown core and areas near transit centers and transit corridors.

Action Items:

- Action 3.1.1. Continue to support the Urban Growth Boundary to facilitate infill development.

- Action 3.1.2. Implement the City's Station Area Plans, Specific Plans, and Corridor Plans.

Measure 3.2: Diversity and Destination Accessibility

Plan for a variety of complementary land uses within walking distance of each other, such as housing, neighborhood-serving retail, and recreational facilities, to decrease the need for vehicular travel.

2015 GHG Reduction

-320 $MTCO_2e/yr$

2020 GHG Reduction

-6,270 $MTCO_2e/yr$

2035 GHG Reduction

-7,840 $MTCO_2e/yr$

Responsible Department(s)

Community Development

Co-Benefits



Action Items:

- Action 3.2.1. Work with new, major employers to ensure that everyday services like dry cleaning, child care, and ATMs are on-site or near the place of employment.

- Action 3.2.2. Improve the non-vehicular transportation network serving common destinations in Santa Rosa in order to facilitate walking and biking.

- Action 3.2.3. Support the mixed-use nature of the downtown area and other new, higher-density

developments near services.

Measure 3.3: Affordable Housing

Support the development of an adequate amount of affordable housing in Santa Rosa.

2015 GHG Reduction

-320 $MTCO_2e/yr$

2020 GHG Reduction

-960 $MTCO_2e/yr$

2035 GHG Reduction

-1,480 $MTCO_2e/yr$

Responsible Department(s)

Community Development

Co-Benefits



Action Items:

- Action 3.3.1. Provide affordable housing development near transit stops and centers in Santa Rosa.
- Action 3.3.2 Implement the Housing Allocation Plan, the City's inclusionary housing ordinance.

Measure 3.4: Parking Supply Limits

Limit the amount of free parking in high traffic areas.

2015 GHG Reduction

-4,810 $MTCO_2e/yr$

2020 GHG Reduction

-12,030 $MTCO_2e/yr$

2035 GHG Reduction

-16,840 $MTCO_2e/yr$

Responsible Department(s)

Community Development, Economic Development & Housing, Transportation & Public Works

Co-Benefits



Action Items:

- Action 3.4.1. Price on-street parking relative to congestion.
- Action 3.4.2. Implement the City's residential parking permit program near high-traffic areas to avoid spillover parking.
- Action 3.4.3. Evaluate the Zoning Code for amendments to reduce parking requirements where alternative transportation is available or planned.

Measure 3.5: Unbundle Parking Costs

Unbundle the price of parking from property costs.

Action Items:

- Action 3.5.1. Investigate mechanisms to unbundle parking costs from rent or property costs for new development.
- Action 3.5.2. Implement a policy which would encourage unbundled parking.

2015 GHG Reduction

-640 $MTCO_2e/yr$

2020 GHG Reduction

-940 $MTCO_2e/yr$

2035 GHG Reduction

-2,220 $MTCO_2e/yr$

Responsible Department(s)

Community Development

Co-Benefits



Measure 3.6: Traffic Calming

Provide traffic calming measures to encourage people to walk or bike instead of drive.

Action Items:

- Action 3.6.1. Install traffic calming design features such as bulb-outs, median barriers, and striped crosswalks to improve pedestrian convenience and encourage pedestrian and bicycle travel.

2015 GHG Reduction

-320 $MTCO_2e/yr$

2020 GHG Reduction

-800 $MTCO_2e/yr$

2035 GHG Reduction

-740 $MTCO_2e/yr$

Responsible Department(s)

Transportation & Public Works

Co-Benefits



GOAL 4: IMPROVED TRANSPORT OPTIONS

Increase the availability of safe, reliable, and convenient alternatives to single-occupancy vehicular travel.

2015 GHG Reduction

-960 $MTCO_2e/yr$

2020 GHG Reduction

-1,880 $MTCO_2e/yr$

2035 GHG Reduction

-3,690 $MTCO_2e/yr$

Responsible Department(s)

Community Development, Transportation & Public Works

Co-Benefits

Measure 4.1: Bicycle and Pedestrian Network

Improve the bicycle and pedestrian network in Santa Rosa through design elements, training, and facilities.

Action Items:

- Action 4.1.1. Implement the Bicycle and Pedestrian Master Plan.
- Action 4.1.2. Update bicycle parking regulations for multi-family homes and commercial businesses to increase bicycle parking citywide.
- Action 4.1.3. Provide bike safety training to residents, employees, and motorists.
- Action 4.1.4. Continue to support the Safe Routes to School (SRTS) and safe routes to transit programs in Santa Rosa.
- Action 4.1.5. Implement a bike-share program.

Measure 4.2: Transit System Improvements

Improve the frequency, efficiency, reliability, and safety of transit to, from, and within Santa Rosa.

2015 GHG Reduction

-1,280 $MTCO_2e/yr$

2020 GHG Reduction

-6,410 $MTCO_2e/yr$

2035 GHG Reduction

-6,410 $MTCO_2e/yr$

Responsible Department(s)

Transit, Community Development, Transportation & Public Works

Co-Benefits

Action Items:

- Action 4.2.1. Implement an Automated Vehicle Location (AVL) system to improve transit system management and performance and to provide real-time arrival and departure data to transit riders through smart phone applications and other technologies.
- Action 4.2.2. Improve the quality and safety of transit centers and bus stops by providing energy-efficient lighting, real-time transit arrival data, and adequate space to wait for buses and for buses to board passengers.

- Action 4.2.3. Support the establishment of a SMART rail service.
- Action 4.2.4. Explore the option of implementing high frequency and rapid bus routes along major transit corridors.
- Action 4.2.5. Guide replacement of fleet vehicles and buses to reduce GHGs by periodic analysis of alternative propulsion systems. Adopt a policy to incrementally replace fleet vehicles and buses to aggressively implement GHG reductions.
- Action 4.2.6. Evaluate transportation system performance on an ongoing basis and adjust service as necessary to maximize transit trips provided.
- Action 4.2.7. Expand transit ridership by identifying measures such as evaluating fare policy and collection practices, utilizing universal fare cards, exploring electronic fare media, and decreasing loading time.

Measure 4.3: Car Sharing and Transportation Demand Management Programs

Increase the number of shared trips and transit trips, and establish car sharing as a viable alternative to owning a car.

2015 GHG Reduction

-320 $MTCO_2e/yr$

2020 GHG Reduction

-4,010 $MTCO_2e/yr$

2035 GHG Reduction

-4,010 $MTCO_2e/yr$

Responsible Department(s)

Community Development, Transit, Transportation & Public Works

Co-Benefits



Action Items:

- Action 4.3.1. Work with car-sharing companies to establish a car-sharing operation in Santa Rosa.
- Action 4.3.2. Work with large employers in Santa Rosa to create rideshare programs, including carpool and vanpool options for employees.
- Action 4.3.3. Evaluate the effectiveness and consider expanding existing programs including guaranteed ride home, employee transit pass programs, and cash for parking pass programs.
- Action 4.3.4. Provide recognition, awards, competitions, or other incentives related to employee commutes in regard to walking, biking, carpooling, transit, or other non-single-occupancy vehicle use.
- Action 4.3.5. Encourage new developments with more than 50 on-site employees to provide subsidized or free transit passes to employees.
- Action 4.3.6. Seek funding and work with Santa Rosa Junior College and local school districts to reinstate subsidized transit passes to junior college and high school students.

- Action 4.3.7. Identify locations for additional park-and-ride lots.

Measure 4.4: Car-Free Sundays

Consider establishing a Car-Free Sunday community event to demonstrate non-vehicular uses for streets.

Action Items:

- Action 4.4.1. Designate a few Sundays each year as car-free days. Rotate the car-free area from neighborhood to neighborhood and encourage alternate modes of travel.

2015 GHG Reduction

Supportive Measure

2020 GHG Reduction

Supportive Measure

2035 GHG Reduction

Supportive Measure

Responsible Department(s)

Community Development, Transportation & Public Works

Co-Benefits



Measure 4.5: Telecommuting

Encourage the development of remote work centers and telecommuting practices.

Action Items:

- Action 4.5.1. Promote workplace alternatives, including telecommuting and home occupations.

2015 GHG Reduction

-520 $MTCO_2e/yr$

2020 GHG Reduction

-830 $MTCO_2e/yr$

2035 GHG Reduction

-1,850 $MTCO_2e/yr$

Responsible Department(s)

Community Development

Co-Benefits



GOAL 5: OPTIMIZED VEHICULAR TRAVEL

Increase the use of electric, hybrid, and alternatively fueled vehicles in Santa Rosa.

2015 GHG Reduction

-1,240 $MTCO_2e/yr$

2020 GHG Reduction

-2,600 $MTCO_2e/yr$

2035 GHG Reduction

-26,430 $MTCO_2e/yr$

Responsible Department(s)

Community Development, Economic Development & Housing

Co-Benefits



Measure 5.1: Electric and Hybrid-Electric Vehicles

Facilitate the purchase and convenient use of electric and hybrid vehicles in Santa Rosa.

Action Items:

- Action 5.1.1. Provide electric vehicle recharging stations in City facilities and parking lots that are equipped with solar-generated power.
- Action 5.1.2. Amend the Zoning Code to require new parking lots to provide electric vehicle recharging.
- Action 5.1.3. Allow EV charging stations as permitted uses in larger parking lots.
- Action 5.1.4. Provide prioritized parking spots to electric and hybrid vehicles in City parking lots.
- Action 5.1.5. Consider a program that provides rebates for employees who purchase electric vehicles.
- Action 5.1.6. Continue to expand the electric vehicle charging network.

Measure 5.2: Biofuel, Fuel Cell, and Alternative Fuels

Support the State's implementation of the Low Carbon Fuel Standard and facilitate the use of alternative fuels in Santa Rosa.

2015 GHG Reduction

-17,280 $MTCO_2e/yr$

2020 GHG Reduction

-52,480 $MTCO_2e/yr$

2035 GHG Reduction

-86,350 $MTCO_2e/yr$

Responsible Department(s)

Community Development, Transportation & Public Works, Utilities

Co-Benefits



Action Items:

- Action 5.2.1. Require new refueling stations to provide biodiesel fuel, compressed natural gas, liquefied natural gas, electric vehicle charging stations, or other alternative fuels.
- Action 5.2.2. Offer guidance and education about diesel-to-biodiesel conversions.
- Action 5.2.3. Utilize the city's wastewater treatment plant to develop a tri-generation fuel cell that can produce hydrogen, in addition to electricity and heat, to provide fuel for City vehicles and/or the public.
- Action 5.2.4. Secure grants and funding to work with existing and new fuel providers to develop alternative fueling stations in Santa Rosa.
- Action 5.2.5. Work with Santa Rosa Junior College to increase participation in alternative fuel technology classes.

Measure 5.3: Anti-Idling

Limit both commercial truck and passenger vehicle idling in Santa Rosa.

2015 GHG Reduction

-900 $MTCO_2e/yr$

2020 GHG Reduction

-2,140 $MTCO_2e/yr$

2035 GHG Reduction

-4,340 $MTCO_2e/yr$

Responsible Department(s)

Police, Community Development

Co-Benefits



Action Items:

- Action 5.3.1. Work with local law enforcement to enforce state idling requirements for commercial vehicles.
- Action 5.3.2. Create a program at local schools to encourage parents and guardians to shut off their cars when waiting to pick up children.
- Action 5.3.3. Consider an amendment to the Zoning Code to prohibit new drive-through facilities.

Measure 5.4: Neighborhood Electric Vehicles

Facilitate the use of neighborhood electric vehicles (NEVs).

2015 GHG Reduction
-560 $MTCO_2e/yr$
2020 GHG Reduction
-2,630 $MTCO_2e/yr$
2035 GHG Reduction
-4,950 $MTCO_2e/yr$

Responsible Department(s)
Transportation & Public Works

Co-Benefits



Action Items:

- Action 5.4.1. Identify streets appropriate for neighborhood electric vehicle use.
- Action 5.4.2. Create a NEV network plan to ensure streets appropriate for NEV use are connected and close to services.
- Action 5.4.3. Partner with the BAAQMD or the California Air Resources Board to provide rebates for residents and businesses that purchase an NEV.
- Action 5.4.4. Develop a map and signage to show the NEV network.

GOAL 6: WASTE REDUCTION, RECYCLING, AND COMPOSTING

Reduce the amount of solid waste sent to landfill from Santa Rosa.

Measure 6.1: Recycling and Composting

Increase the amount of waste that is recycled and composted.

2015 GHG Reduction
-25,170 $MTCO_2e/yr$
2020 GHG Reduction
-64,370 $MTCO_2e/yr$
2035 GHG Reduction
-129,720 $MTCO_2e/yr$

Responsible Department(s)
Transportation & Public Works, Community Development

Co-Benefits



Action Items:

- Action 6.1.1. Work with local waste haulers to improve the amount and types of waste that are accepted for curbside recycling and green waste pickup. Conduct outreach to and education of the public for dissemination of the information and options.
- Action 6.1.2. Work with the Sonoma County Waste Management Authority to encourage local restaurants to compost food and provide recyclable or compostable to-go containers.
- Action 6.1.3. Increase the City's construction and demolition ordinance to require 75% diversion by 2020 and 85% diversion by 2035.

Measure 6.2: Materials Management

Reduce the availability or use of common materials that are not recyclable or that are not cost-effective to recycle.

2015 GHG Reduction
Supportive Measure
2020 GHG Reduction
Supportive Measure
2035 GHG Reduction
Supportive Measure

Responsible Department(s)
Transportation & Public Works, Community Development

Co-Benefits



Action Items:

- Action 6.2.1. Discourage the use of Styrofoam containers and plastic bags.
- Action 6.2.2. Encourage local businesses to reduce amounts of packaging used.
- Action 6.2.3. Discourage the use of bottled water at City events.
- Action 6.2.4. Adopt a long-term waste diversion goal to extend beyond the Sonoma County Waste Management Agency's goal of a 70% diversion rate by 2015 and the State's goal of 75% diversion by 2020 consistent with state law (AB 341).

GOAL 7: WATER AND WASTEWATER

Improve the efficiency of wastewater and water operations in Santa Rosa, and continue to develop a diversified water supply portfolio, including water conservation and recycled water, in order to enhance water supply reliability.

Measure 7.1: Water Conservation

Continue to require and incentivize water conservation.

2015 GHG Reduction
-1,170 $MTCO_2e/yr$
2020 GHG Reduction
-1,700 $MTCO_2e/yr$
2035 GHG Reduction
-2,210 $MTCO_2e/yr$

Responsible Department(s)
Utilities

Co-Benefits



Action Items:

- Action 7.1.1. Require new development to reduce potable water use in accordance with the Tier 1 standards of CALGreen.
- Action 7.1.2. Continue and expand water conservation efforts including water-efficient landscaping, rainwater harvesting, and high-efficiency appliance and fixture installations.
- Action 7.1.3. Replace water meters in Santa Rosa with meters that allow residents and businesses to track real-time water use through the City's online web application.

- Action 7.1.4. Encourage existing development and require new development to utilize smart water meters to facilitate water and cost savings.

Measure 7.2: Wastewater and Water Operations

Improve the efficiency of water and wastewater facilities and operations serving the Santa Rosa community.

Action Items:

- Action 7.2.1. Continue to provide recycled water to the Geysers project to generate clean energy.
- Action 7.2.2. Continue to develop and install innovative renewable energy projects at the Laguna Treatment Plant.

2015 GHG Reduction

-1,240 $MTCO_2e/yr$

2020 GHG Reduction

-2,050 $MTCO_2e/yr$

2035 GHG Reduction

-3,960 $MTCO_2e/yr$

Responsible Department(s)

Utilities

Co-Benefits



Measure 7.3: Recycled Water

Increase the use of recycled water in Santa Rosa.

Action Items:

- Action 7.3.1. Expand the infrastructure network to deliver recycled water for use at businesses, city parks and facilities, and common area residential landscapes.
- Action 7.3.2. Require new development in zones anticipated to receive future recycled water to meet on-site meter separation requirements to allow for the use of recycled water.

2015 GHG Reduction

Supportive Measure

2020 GHG Reduction

Supportive Measure

2035 GHG Reduction

Supportive Measure

Responsible Department(s)

Utilities

Co-Benefits



GOAL 8: AGRICULTURE AND LOCAL FOOD

Improve the efficiency of agricultural operations and food consumption in Santa Rosa.

2015 GHG Reduction
Supportive Measure
2020 GHG Reduction
Supportive Measure
2035 GHG Reduction
Supportive Measure

Responsible Department(s)
Community Development, Recreation, Parks & Community Services

Co-Benefits



Measure 8.1: Local Food Systems

Increase the amount of food grown and consumed locally.

Action Items:

- Action 8.1.1. Incentivize residential agriculture.
- Action 8.1.2. Promote the growing of fruits and vegetables in front yards.
- Action 8.1.3. Establish community gardens and urban farms throughout the city.
- Action 8.1.4. Revise the City's Zoning Code to allow for small animals, chickens, and bees.
- Action 8.1.5. Promote a Santa Rosa Slow Food campaign for local and organic restaurants and wineries.

GOAL 9: OFF-ROAD VEHICLES AND EQUIPMENT

Reduce emissions from construction and lawn and garden activities.

2015 GHG Reduction
-10 $MTCO_2e/yr$
2020 GHG Reduction
-20 $MTCO_2e/yr$
2035 GHG Reduction
-50 $MTCO_2e/yr$

Responsible Department(s)
Community Development, Utilities

Co-Benefits



Measure 9.1: Lawn and Garden Activity

Encourage the use of electrified and higher-efficiency lawn and garden equipment.

Action Items:

- Action 9.1.1. Support the BAAQMD's efforts to re-establish a voluntary exchange program for residential lawn mowers and backpack-style leaf blowers.
- Action 9.1.2. Encourage new buildings to provide electrical outlets on the exterior in an accessible location to charge electric-powered lawn and garden equipment.
- Action 9.1.3. Encourage the replacement of existing high maintenance and high water use landscapes (such as

removing turf through the Green Exchange rebate program) with low water use vegetation to reduce the need for gas-powered lawn and garden equipment.

Measure 9.2: Construction Emissions

Reduce emissions from heavy-duty construction equipment by limiting idling and utilizing cleaner fuels, equipment, and vehicles.

Action Items:

2015 GHG Reduction

-350 $MTCO_2e/yr$

2020 GHG Reduction

-360 $MTCO_2e/yr$

2035 GHG Reduction

-450 $MTCO_2e/yr$

Responsible Department(s)

Community Development

Co-Benefits



- Action 9.2.1. Minimize idling times either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes or less (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Provide clear signage at all access points to remind employees of idling restrictions.
- Action 9.2.2. Construction equipment shall be maintained in accordance with manufacturer's specifications.
- Action 9.2.3. Work with project applicants to limit GHG emissions from construction equipment by selecting one of the following measures, at a minimum, as appropriate to the construction project:
    a. Substitute electrified equipment for diesel- and gasoline-powered equipment where practical.
    b. Use alternative fuels for construction equipment on-site, where feasible, such as compressed natural gas (CNG), liquefied natural gas (LNG), propane, or biodiesel.
    c. Avoid the use of on-site generators by connecting to grid electricity or utilizing solar-powered equipment.

GHG REDUCTION SUMMARY

This Plan identifies a clear path to allow the City to reach the community-wide GHG reduction target of 25% below 1990 levels. With GHG reduction targets more aggressive than the minimum CEQA and BAAQMD requirements, it is important to identify how the City will meet or exceed the minimum GHG reduction target of 15% below baseline levels by 2020 to ensure the City can utilize the Climate Action Plan as a Qualified GHG Reduction Strategy for use in environmental review of projects for new development.

The reduction measures included in this Plan are a diverse mix of regulatory and incentive-based programs for both new and existing development. The reduction measures also aim to reduce GHG emissions from each source to avoid reliance on any one strategy or sector to achieve the target. In total, existing actions, state programs, and GHG reduction measures in this Plan will reduce GHG emissions in the Urban Growth Boundary of the City of Santa Rosa in 2020 by 558,080 $MTCO_2e$ (see **Table 8** and **Figure 13**). **Figures 14**, **15**, and **16** demonstrate the GHG reductions achieved by goal for 2015, 2020, and 2035, respectively.

TABLE 8: GHG REDUCTION SUMMARY BY TOPIC

Goal Topic	2015	2020	2035
State Programs	-84,400	-161,760	-387,040
Existing Local Programs	-26,920	-27,640	-40,110
Energy Efficiency and Conservation	-26,060	-117,690	-142,340
Renewable Energy	-30,380	-76,830	-85,520
Parking and Land Use Management	-11,860	-32,680	-39,900
Improved Transport Options	-3,080	-13,130	-15,960
Optimized Vehicular Travel	-19,980	-59,850	-122,070
Waste Reduction, Recycling, and Composting	-25,170	-64,370	-129,720
Water and Wastewater	-2,410	-3,750	-6,170
Agriculture and Local Food	0	0	0
Off-Road Vehicles and Equipment	-360	-380	-500
TOTAL	**-230,620**	**-558,080**	**-969,330**

Table 8 illustrates that through state programs, local programs, and implementation of measures contained in this plan, a reduction of 558,080 $MTCO_2e$ will be achieved. **Table 9** illustrates reductions (in $MTCO_2e$) needed to meet the state and local targets, as compared to business as usual.

TABLE 9: 2020 ACHIEVEMENT OF STATE AND LOCAL TARGETS

Target Translations	2020 ($MTCO_2e$)	Reduction Needed to Meet Target	Cushion from Targets with Full CAP
2007 Baseline Emissions	1,321,250		
Business As Usual (BAU)	1,396,940		
State Target (15% below baseline)	1,123,060	-273,880	284,200
Local Target (25% below 1990 levels)	842,290	-554,650	3,430

FIGURE 13: 2020 GHG REDUCTIONS BY IMPLEMENTATION STATUS ($MTCO_2E$)

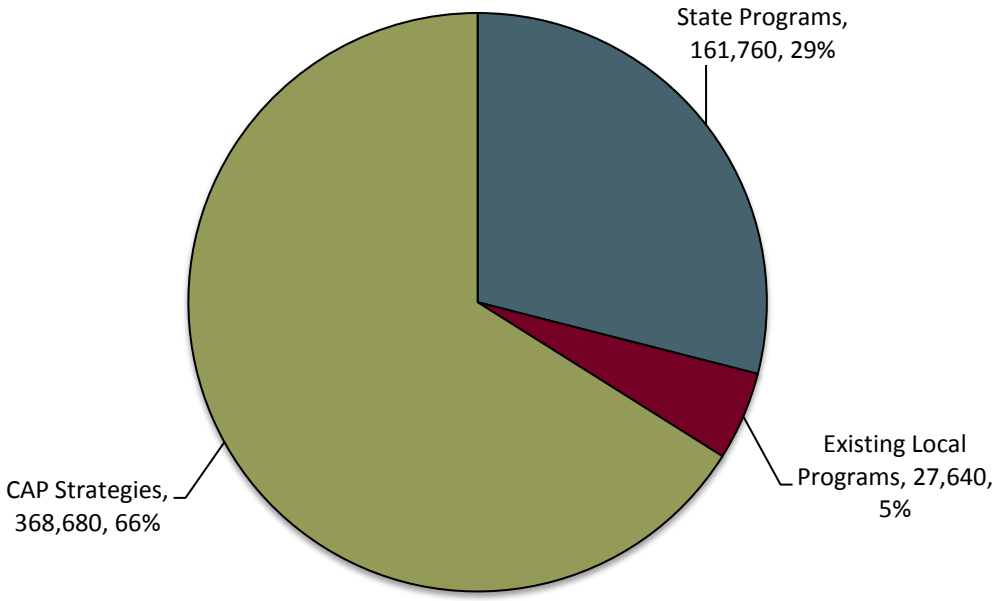


FIGURE 14: 2015 EMISSIONS REDUCTIONS BY GOAL ($MTCO_2E$)

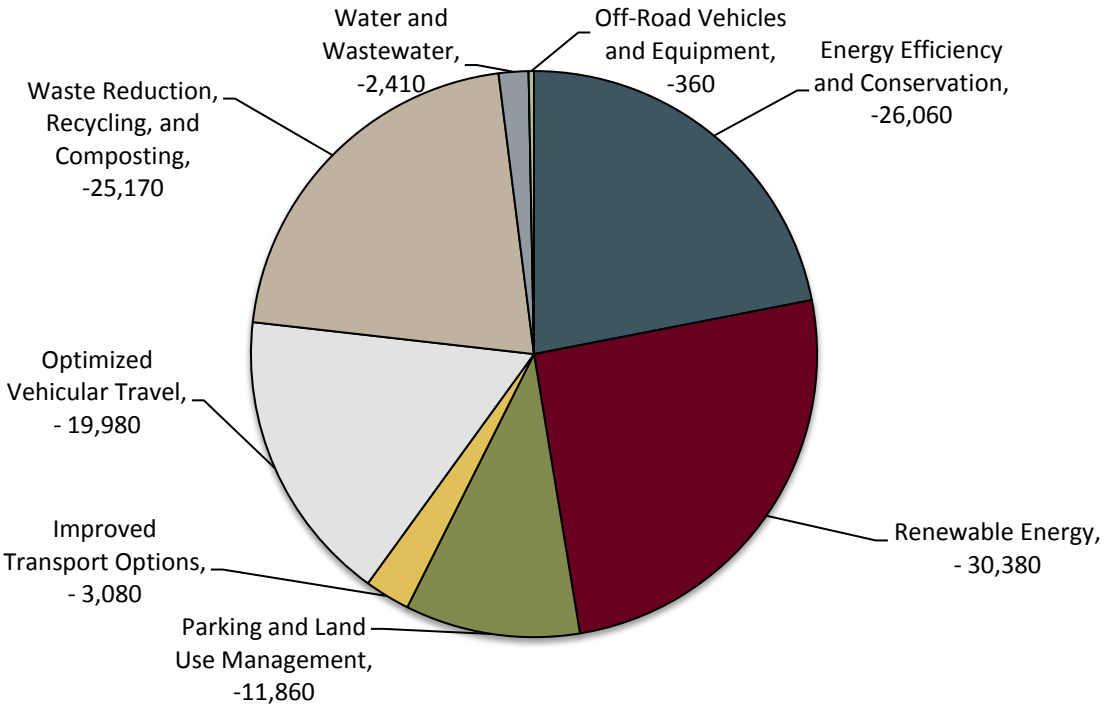


FIGURE 15: 2020 EMISSIONS REDUCTIONS BY GOAL ($MTCO_2E$)

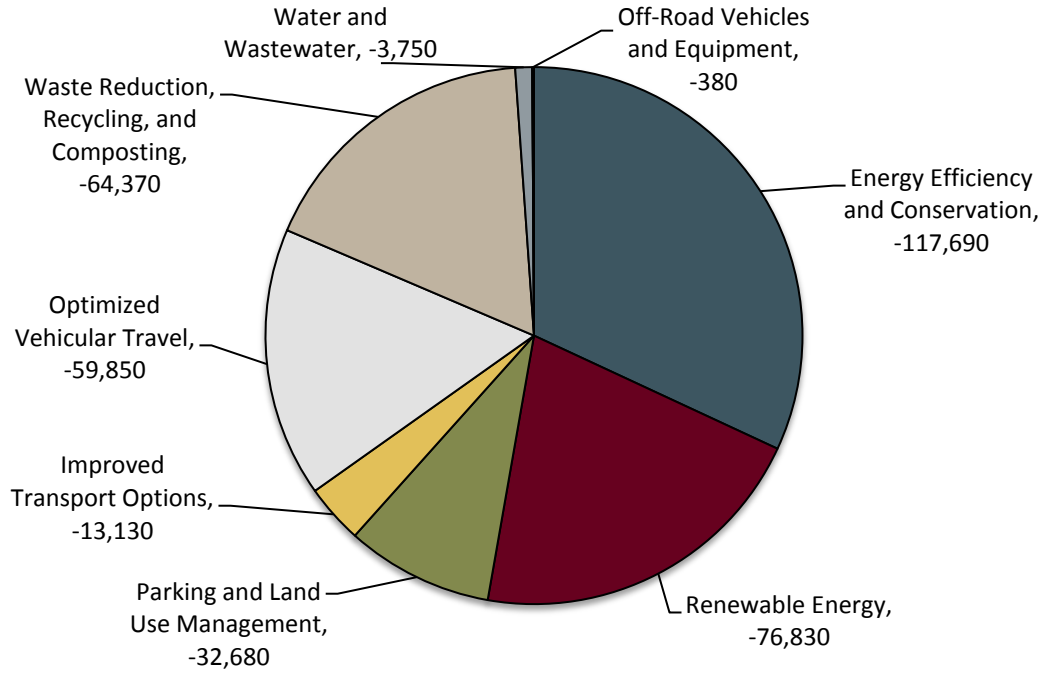
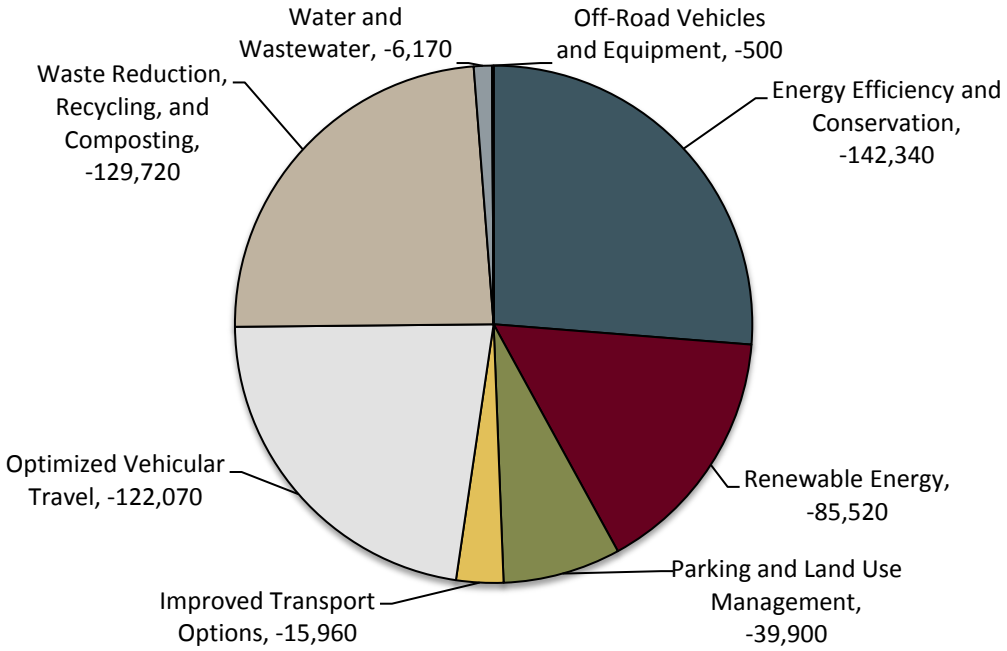
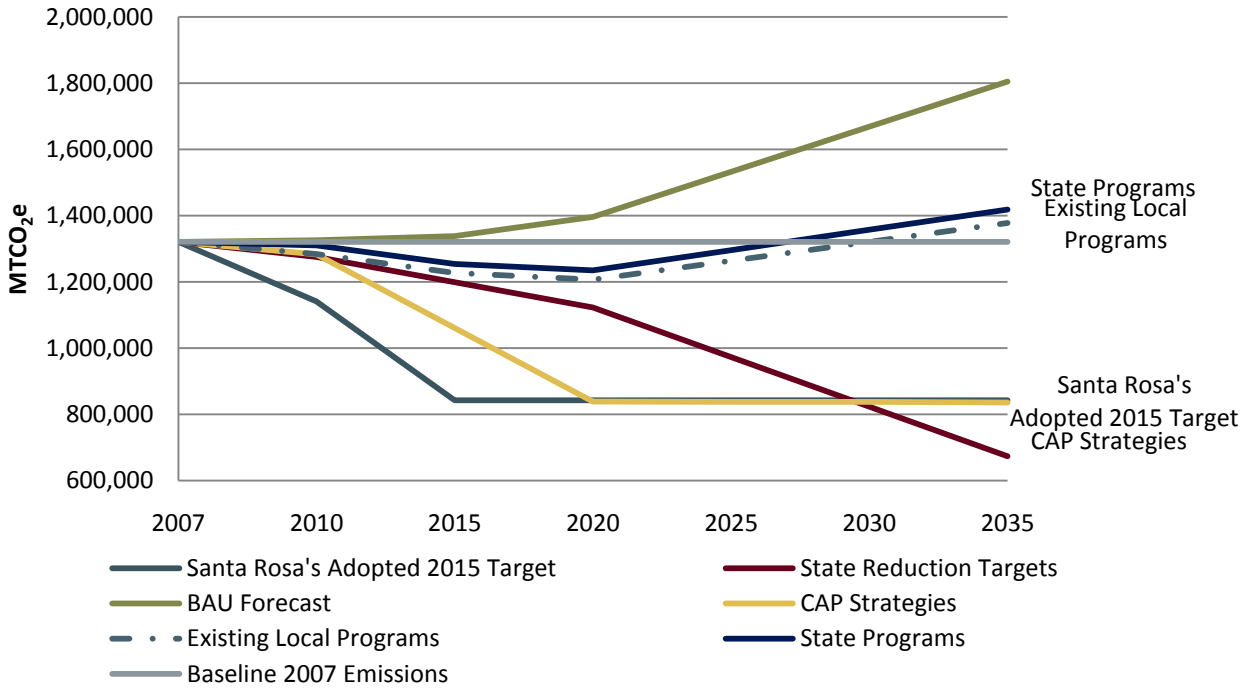


FIGURE 16: 2035 EMISSIONS REDUCTIONS BY GOAL ($MTCO_2E$)



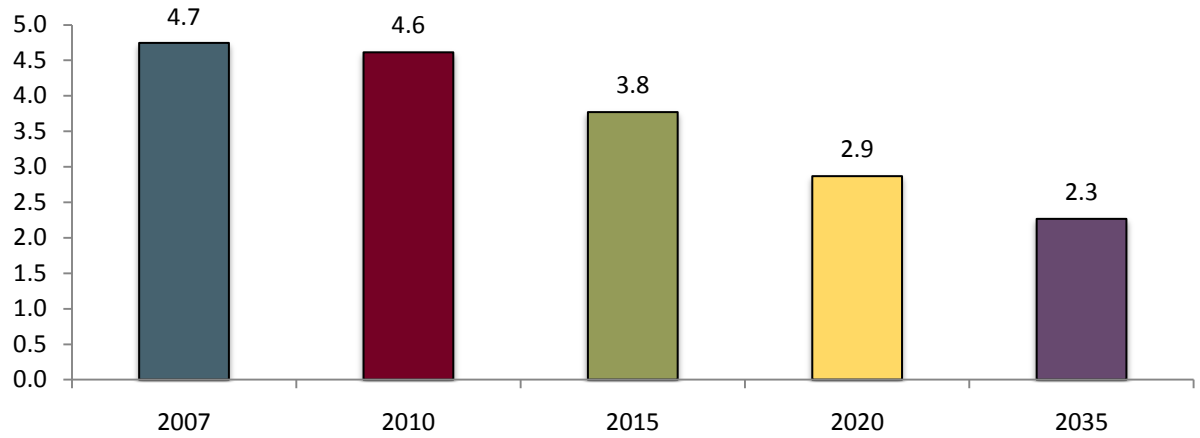
Complete implementation of this Plan will allow the City to achieve the adopted target of reducing GHG emissions 25% below 1990 levels by 2020 and will set the City on a trajectory to achieve the state GHG reduction target set by E.O. S-3-05 of reducing GHG emissions 80% below 1990 levels by 2050. **Figure 17** shows the City's anticipated progress toward achieving the GHG reduction target through the implementation of this Plan.

FIGURE 17: GHG REDUCTION TARGET ACHIEVEMENT



Achievement of the City's adopted target by 2020 will exceed state recommendations and BAAQMD threshold requirements for developing a Qualified GHG Reduction Strategy by approximately 22%. As shown in **Figure 18**, through the implementation of this Plan, the City's GHG emissions will decrease from 4.7 $MTCO_2e$ per person per year in 2007 to 2.3 $MTCO_2e$ per person per year in 2035.

FIGURE 18: GHG EMISSIONS PER SERVICE POPULATION ($MTCO_2E$)



CHAPTER 5 –
ADAPTATION

City of Santa Rosa
Community Development

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5. ADAPTATION

Even with significant efforts to mitigate GHG emissions today, future climate projections anticipate that climate change may have significant effects on California's and Santa Rosa's precipitation, temperature, and weather patterns. Santa Rosa is located in Sonoma County in the San Francisco Bay Area. The potential consequences of climate change for the State of California and the City of Santa Rosa include those described below. This chapter summarizes the anticipated effects climate change may have on California and the Northern California region, which may include:

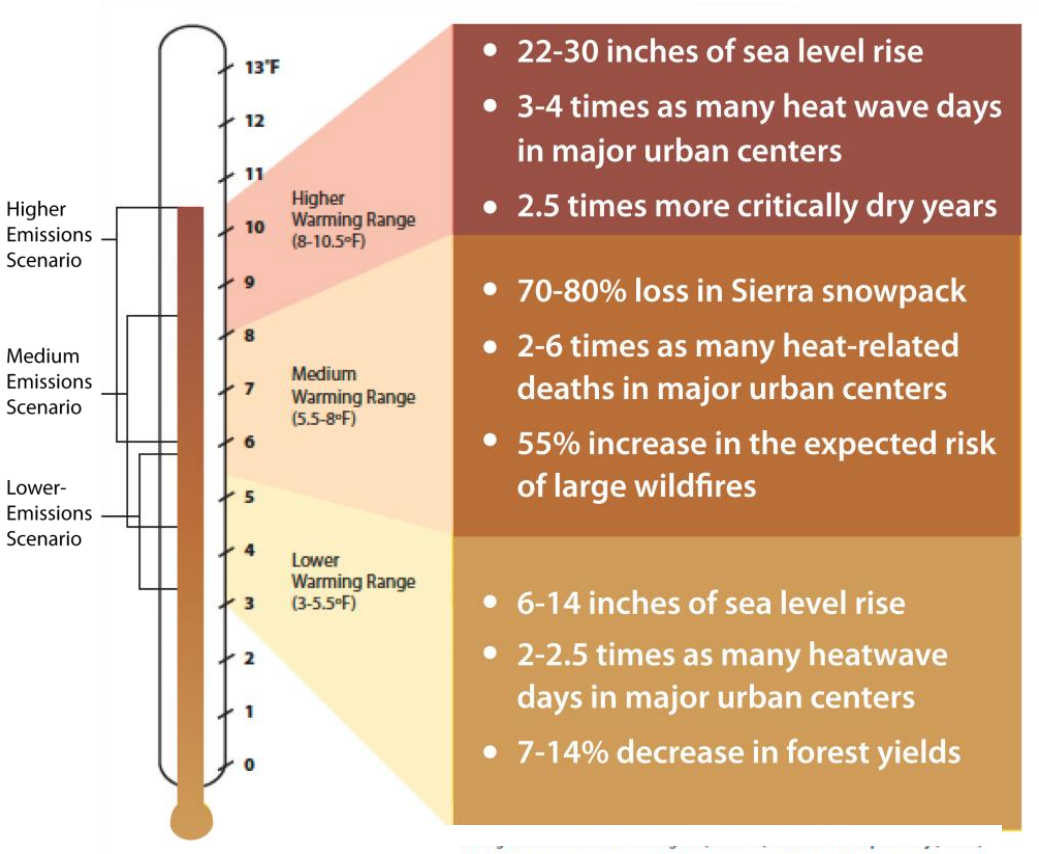
- Increased wildfire risk;
- Negative impacts to wildlife;
- Deteriorating public health;
- Decreased supply of fresh water;
- Increased sea level rise.

CLIMATE CHANGE IMPACTS IN SANTA ROSA

Research suggests that California may experience hotter and drier conditions, reductions in winter snow and increases in winter rains, sea level rise, and an increased occurrence of extreme weather events. Such compounded impacts will affect economic systems throughout the state. To refrain from action is costly and risky; the California Climate Adaptation Strategy estimates that no action to address the potential impacts of climate change will lead to sector-wide losses of "tens of billions of dollars per year in direct costs" and "expose trillions of dollars of assets to collateral risk."[10] Potential impacts in California due to climate change are summarized in **Figure 19.**

[10] California Natural Resources Agency 2009.

FIGURE 19: CALIFORNIA CLIMATE CHANGE IMPACTS



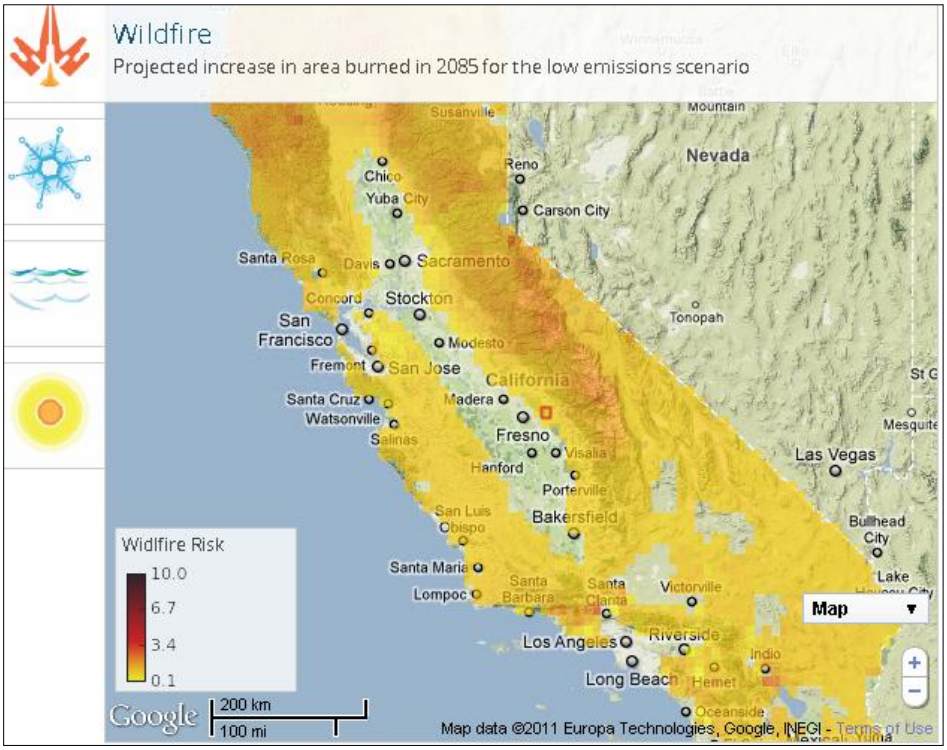
Source: California Energy Commission 2006. Our Changing Climate: Assessing the Risks to California. Web Document. Sacramento: California Energy Commission.

Increased Rate of Wildfires

Wildfire risk is based on a combination of factors including precipitation, winds, temperature, and vegetation. Wildfires are likely to grow in number and size throughout the state as a result of increased temperatures induced by climate change. Even under the "medium" warming scenario predicted by the Intergovernmental Panel on Climate Change, wildfire risk will likely increase by 55% in California (see **Figure 20**).[11] Further, as wildfires increase in frequency and size, they will also increase in intensity.[12]

[11] California Natural Resources Agency 2009.
[12] California Natural Resources Agency 2009.

FIGURE 20: CALIFORNIA 2085 WILDFIRE RISKS, LOW EMISSIONS SCENARIO



Source: California Energy Commission 2011. Cal-Adapt Local Climate Snapshots.

Negative Impacts on Wildlife

As temperatures rise, species move north in California or to higher elevations. This change in migration disrupts the food chain and prevents some plant species from being pollinated. With vegetation, reduction in soil moisture will result in early dieback of many plants, potentially leading to conflicts with animal breeding seasons and other natural processes. Several potential hydrological changes associated with global climate change could also specifically influence the ecology of aquatic life in California and have several negative effects on cold-water fish. For example, if a rise in air temperature by just a few degrees Celsius occurs, this change could be enough to raise the water temperatures above the tolerance of salmon and trout in many streams, favoring instead non-native fishes such as sunfish and carp. Many of the potential effects on wildlife are still being studied, but due to an inability to quickly adapt to new climates, the potential for severe species loss is present.

Deteriorating Public Health

Heat waves are expected to have a major impact on public health, as well as decreasing air quality and increasing mosquito breeding and mosquito-borne diseases. Further, climate change is expected to alter the spread and prevalence of disease vectors and lead to a possible decrease in

food quality and security.[13] Vector control districts throughout the state are already evaluating how they will address the expected changes to California's climate.

According to a new report from the California Air Resources Board, the warming climate will increase ozone levels in California's major air basins, leading to upwards of 6 to 30 more days per year with ozone concentrations that exceed federal clean air standards. The elderly, young, and vulnerable populations most likely to be impacted by climate change are also those that often lack sufficient resources to adapt. Such vulnerable demographics are likely to need assistance to respond to climate change, which leads to social equity issues related to the unequal distribution of resources and increased costs to address community-wide health risks.

Sea Level Rise

The Bay Area coastline could face inundation as a result of sea level rise and global warming. As temperatures rise, the ocean waters rise as well due to thermal expansion and the melting of glaciers and snowpack. The State's 2009 Climate Change Impacts Assessment (the 2009 Scenarios Project) estimates that sea levels will rise by 12 to 18 inches by 2050 and 21 to 55 inches by 2100. While sea level rise will not have an immediate effect on Santa Rosa, the city may experience indirect effects.

EXISTING ADAPTATION EFFORTS

California Climate Adaptation Strategy

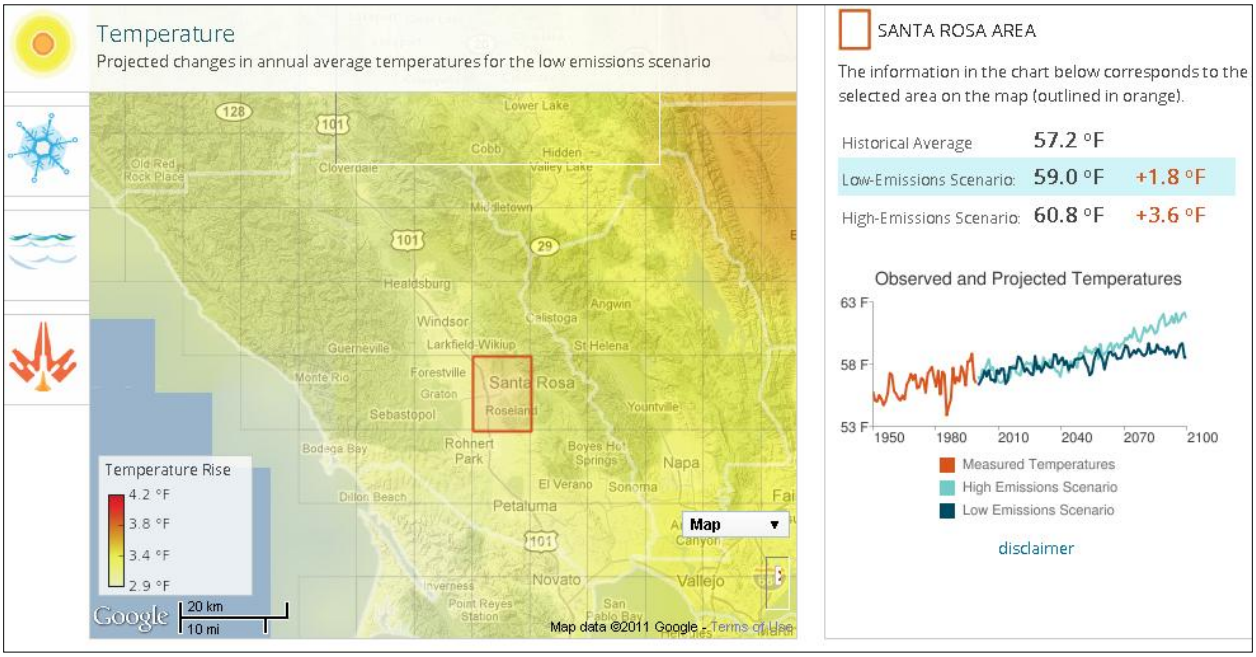
In 2009, the California Natural Resources Agency released the California Climate Adaptation Strategy as a guide to both state and local agencies on appropriate strategies to adapt to climate change impacts. The guide includes adaptation strategies for public health, biodiversity, ocean and coastal resources, water management, agriculture, forestry, transportation, and energy infrastructure sectors.

Cal-Adapt

Cal-Adapt is a multifaceted web portal, focusing on climate change effects and adaptation, that presents global climate change data from both historic observations and international computer models in an easy-to-use format. The tool allows users to interactively view historic and future temperature, snowpack, wildfire risk, and rainfall for their neighborhood, city, or all of California in a Google map, as shown in **Figure 21** below. To supplement the maps and projections, nearly 2,000 scholarly journal papers and abstracts are available for study in the portal's publications section, and all of the historic and future data used to create the models is also available.

[13] California Natural Resources Agency 2009.

FIGURE 21: CAL-ADAPT TEMPERATURE MAP AND PROJECTIONS



Source: California Energy Commission 2011. Cal-Adapt Local Climate Snapshots.

San Francisco Planning and Urban Research, Climate Change Hits Home

San Francisco Planning and Urban Research Association's (SPUR) adaptation report, "Climate Change Hits Home," was published in May 2011. The report recommends 30 adaptation strategies and tools to implement at a local and regional scale to minimize the impact that climate change may have on public safety and health, transportation, ecosystems and bio-diversity, energy, water management, and sea level rise. The report includes a Plan of Action identifying where local governments can act as the primary implementer of the strategies listed in **Table 10**.

TABLE 10: PLAN OF ACTION FOR LOCAL GOVERNMENTS

Responsible Agency	Action
Public Works Department	Reduce urban heat island effect through three principal "no-regrets" strategies: expanding the urban forest, promoting white roofs, and using light-colored pavement materials.
Public Works/Building Departments	Evaluate alternatives and phase in the use of light-colored concrete, paving, and roofing materials on municipal properties.
Building Departments	Cities should begin to require lighter materials or white roofs in private development by amending existing building codes for new buildings and major retrofits.
PG&E Local Governments	Evaluate existing energy-efficiency and demand response programs for their effectiveness at shaving peak electricity demand in more frequent and prolonged hot weather.
Building Departments	Replace or retrofit the building stock over time with resource-efficient, climate-adaptive buildings.
Water Utilities	Develop water-supply scenarios for mid-century and beyond that include assumptions about changes (especially decreases) in precipitation amounts and timing.
Water Utilities	Evaluate alternative water-supply opportunities and demand-management strategies such as water conservation, water recycling and desalination, and prioritize investment in these strategies according to cost, reliability, and environmental benefits.
Water/Stormwater Utilities	Expand investments in "green infrastructure" or low-impact development.
Wastewater Utilities	Evaluate the vulnerability of wastewater collection and treatment systems to severe storms, sea level rise, and storm surge.

DIFFERENTIATING MITIGATION & ADAPTATION MEASURES

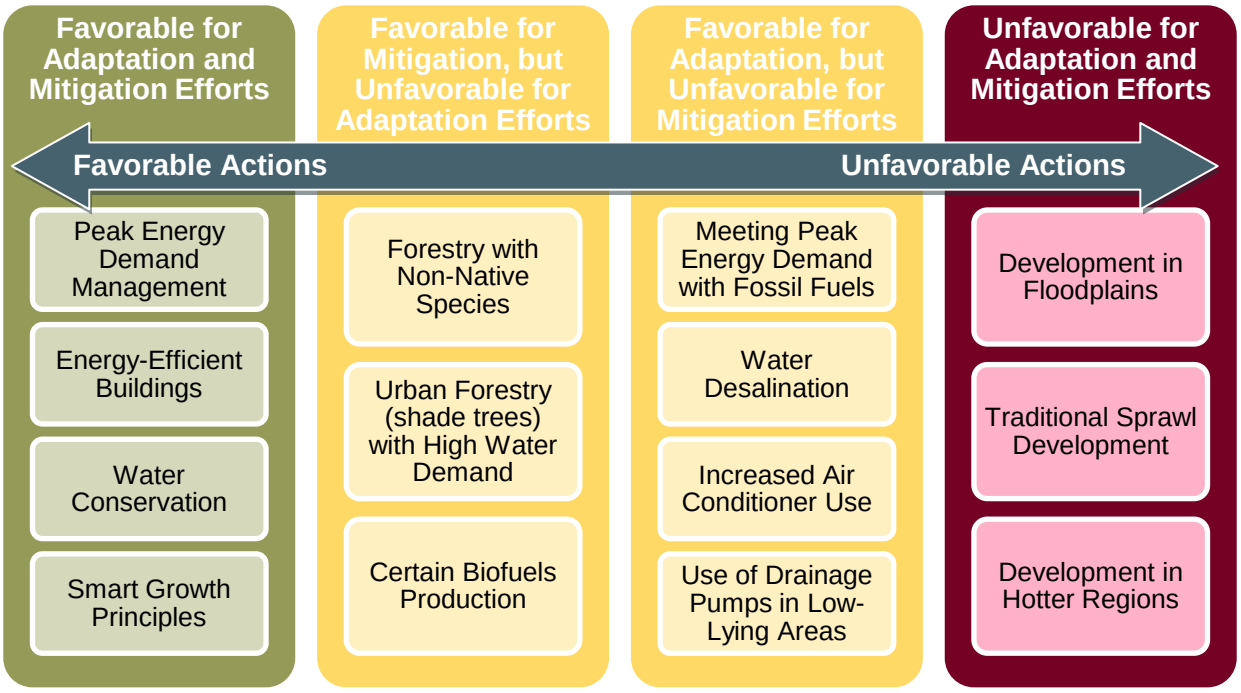
The City of Santa Rosa is already implementing several of the strategies listed above and has included many of these strategies in this Plan that serve as both adaptation and mitigation measures. Adaptation and reduction measures are closely tied, but differ in that adaptation measures address the *effects* of climate change, whereas reduction or mitigation measures address the *cause*. The adaptation measures in this chapter are presented in a different format than the reduction measures, as the adaptation measures have not been quantified for their greenhouse gas (GHG), energy, or economic benefits.

There are two types of adaptation measures: operational changes and increases to adaptive capacity. Operational measures assess climate change vulnerabilities and sensitive populations on a regular basis. They also address climate change adaptation in planning and public safety documents. Adaptive capacity measures are strategies that help prepare for and adjust to the impacts of climate change. Examples include the establishment of cooling centers during heat waves, promotion of energy efficiency and renewable energy to reduce peak load demand, and implementation of low impact development standards to reduce stormwater runoff and increase groundwater recharge. It should be noted that this adaptation chapter is meant to serve as a starting point for the City by including measures that will direct operational changes to identify potential climate change impacts and vulnerabilities but does not include adaptive capacity measures to address specific climate change impacts.

While adaptation measures and reduction/mitigation measures may differ significantly in their goals, there can be significant common ground between them. For instance, a mitigation measure to plant native trees reduces GHG by sequestering carbon and can lower energy consumption for air conditioning. Native tree planting also helps to adapt to climate change impacts by reducing the urban heat island effect and increasing storm water infiltration. **Figure 22** presents a spectrum of complementary and conflicting adaptation and mitigation (or GHG reduction) actions.

It should be noted that not all adaptation measures are reduction measures, and vice versa. This Plan incorporates adaptation measures that are not harmful to or in conflict with proposed GHG reduction or mitigation efforts at *this time*.

FIGURE 22: COMPLEMENTARY & CONFLICTING ADAPTATION & MITIGATION ACTIONS



Source: Bedsworth and Hanak 2008

ADAPTATION STRATEGIES

To ensure climate change adaptation is adequately incorporated into future planning efforts, the following measures have been provided to guide City staff involvement in coordinating, preparing for, and educating the public on the potential impacts that climate change may have on the community.

Adaptation Measure 1: Regional Coordination

Participate in regional efforts to analyze and prepare for the impacts of climate change in the Bay Area.

Action Items:

- Action 1.1. Join regional adaptation and resiliency task forces such as that of the San Francisco Bay Area Conservation and Development Commission (BCDC) and the Joint Policy Committee (JPC).
- Action 1.2. Appoint a staff liaison to attend and participate in regional meetings focusing on adaptation and resilience and to report to staff on a regular basis.

Adaptation Measure 2: Preparedness

Ensure that Santa Rosa is prepared for potential environmental risks and hazards related to climate change, with a special emphasis on vulnerable populations.

Action Items:

- Action 2.1. Regularly train, inform, and solicit feedback from the City's Fire and Police Departments on potential climate change risks and hazards.
- Action 2.2. Revise City Hazard Mitigation Plans and other applicable documents such as long-range capital improvement plans to prioritize climate change issues and best practices during required updates and as funding permits.
- Action 2.3. Monitor climate change science and policy and regularly inform stakeholders of new information.

Adaptation Measure 3: Adaptation Mainstreaming

Integrate potential climate change impacts into local planning documents and processes.

Action Items:

- Action 3.1. During the development review process, consider possible impacts of climate change on the project or plan area.

- Action 3.2. Integrate climate change adaptation into future updates of the Zoning Code, Building Code, General Plan, Urban Water Management Plan, and other related documents.

Adaptation Measure 4: Community Engagement

Engage the community in preparing for climate change through the promotion of Climate Action Plan measures, distribution of information, and through local schools.

Action Items:

- Action 4.1. Utilize the City's website and local media channel for advertisements/green tips/information on programs.
- Action 4.2. Distribute information regarding climate change to local schools.
- Action 4.3. Promote sustainability education in schools through green competitions that encourage recycling, walking, and biking.

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CHAPTER 6 –
IMPLEMENTATION

City of Santa Rosa
Community Development

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6. IMPLEMENTATION

Reducing GHG emissions 25% below baseline 1990 levels is a significant task. This chapter outlines a path for the City to monitor progress and summarizes the GHG reductions that will occur through the implementation of this Plan.

IMPLEMENTATION POLICIES

To ensure the success of this Climate Action Plan, the City will integrate the goals and strategies of this Plan into other local and regional plans, programs, and activities. As the City moves forward with Zoning Code updates, Specific Plans, Housing Element updates, and other planning documents, staff will ensure that these documents support and are consistent with the CAP.

CAP implementation will require City leadership to execute these measures and report on the progress of their implementation. This Plan identifies the responsible department for each measure and offers time frames and cost estimates for implementing each strategy. Lastly, successful implementation requires regular reporting. Staff will monitor the CAP's implementation progress on an annual basis and report to the City Council on the progress made each year. Development of an implementation and monitoring tool will assist in tracking progress. The following policies are presented to ensure the City is successful in the implementation of the CAP.

Implementation Measure 1: Monitoring

Annually monitor and report the City's progress toward achieving the reduction target.

Action Items:

- Action 1.1. Facilitate implementation of measures and actions related to municipal operations.
- Action 1.2. Prepare an annual progress report for review and consideration by the City Council.
- Action 1.3. Utilize the monitoring and reporting tool to assist with annual reports.
- Action 1.4. Identify key staff responsible for annual reporting and monitoring.

Implementation Measure 2: Update GHG Inventory and Plan

Update the baseline greenhouse gas emissions inventory and Climate Action Plan at a minimum, every five years.

Action Items:

- Action 2.1. Inventory 2010 GHG emissions no later than 2017.
- Action 2.2. Update the Climate Action Plan no later than 2017 to incorporate new technology, programs, and policies to reduce GHG emissions.

- Action 2.3. Consider updating and amending the Plan, as necessary, should the City find that specific reduction measures are not meeting intended GHG reductions.

Implementation Measure 3: Collaborative Partnerships

Continue to develop partnerships that support implementation of the Climate Action Plan.

Action Items:

- Action 3.1. Continue formal memberships and participation in local and regional organizations that provide tools and support for energy efficiency, energy conservation, greenhouse gas emissions reductions, adaptation, education, and implementation of this plan such as the Regional Climate Protection Agency and the Climate Protection Campaign.

Implementation Measure 4: Funding Sources

Secure necessary funding to implement the Climate Action Plan.

Action Items:

- Action 4.1. Identify funding sources for reduction measures as part of annual reporting.
- Action 4.2. Ensure implementation through the inclusion of emissions reduction and adaptation measures in department budgets, the capital improvement program, and other plans as appropriate.
- Action 4.3. Pursue local, regional, state, and federal grants as appropriate to support implementation.

IMPLEMENTATION MATRIX

This matrix contains the GHG reduction, performance target, implementation time frame, and the responsible and supporting agencies information presented in **Chapter 4** for the year 2020, as well as more detail for City staff to effectively integrate these actions into budgets, the capital improvement program, and other programs and projects.

#	Short Description	Emissions Reduction			Performance Target	CITY*		COMMUNITY*		Priority
		2015	2020	2035		Cost	Saving	Cost	Saving	L, M, H
1	ENERGY EFFICIENCY									
1.1	Continue to enforce CALGreen requirements	Included				MN	MN	H	LM	
1.1.1	New development compliance with CALGreen standards				All new development complies					
1.1.2	Continue Tier 1 standards for new development									
1.1.3	New development built with net zero electricity use in 2020									
1.1.4	Evaluate incentives to net zero electricity use prior to 2020									
1.2	Facilitate energy efficiency in existing buildings	-20,140	-103,390	-112,870	Building retrofit goals: 2015:15% 2020: 80% 2035: 85%	H	MN	H	H	
1.2.1	Provide information on free or low-cost energy audits									
1.2.2	Work with SCEIP to offer assistance, financing for retrofits									
1.2.3	Create informational brochure/website for renters									
1.2.4	Create informational brochure/website for historic buildings									
1.2.5	Seek funding to retrofit affordable housing units									
1.2.6	Identify neighborhoods appropriate for retrofit pilot program									
1.2.7	Reduce energy use in all City facilities									
1.2.8	Reduce energy use in city schools and at SR Junior College									
1.2.9	Reduce energy use in all existing buildings									
1.3	Smart Meter utilization	-3,900	-7,650	-12,920	Res energy	MN	MN	MN	H	

#	Short Description	Emissions Reduction			Performance Target	CITY*		COMMUNITY*		Priority
		2015	2020	2035		Cost	Saving	Cost	Saving	L, M, H
1.3.1	Require real-time energy monitors to track energy use				monitors: 30%, 50%, 75% Non-res: 15%, 40%, 50%					
1.3.2	Inform community regarding metering options									
1.3.3	Provide information on appliance rebates									
1.4	Plant and maintain trees	-750	-1,640	-5,220	2015: 700 trees/yr 2020: 1,000 2035: 1,000	LM	MN	MH	MH	
1.4.1	Develop a tree inventory									
1.4.2	Implement the City tree preservation ordinance									
1.4.3	Require new development to provide public & private trees									
1.4.4	Create an Urban Greening Policy									
1.4.5	Develop a web application to provide updated tree information									
1.5	Require new sidewalks, paving to have high solar reflectivity	-110	-250	-650	2015: 10% roads high albedo 2020: 25% 2035: 50%	LM	MN	L	L	
1.5.1	Adopt ordinance requiring use of cool paving and roof materials									
1.5.2	Incorporate green/living roof specifications in ordinance; address energy installations on historic structures									
1.5.3	Create pilot program for Green Streets Policy									
1.6	Facilitate use of energy-efficient appliances	-410	-520	-860	2015: 15% homes 2020: 15% 2035: 25%	M	MN	MH	M	
1.6.1	Find funds to develop rebate program for appliances									
1.7	Switch natural gas appliances to electricity	-750	-4,240	-9,820	2015: 10% replaced dryers and stoves 2020: 50% 2035: 80%	MN	MN	MN	MN	
1.7.1	Utilize appliance rebate program for replacement									
1.7.2	Identify programs to facilitate replacement									

#	Short Description	Emissions Reduction			Performance Target	CITY*		COMMUNITY*		Priority
		2015	2020	2035		Cost	Saving	Cost	Saving	L, M, H
2	RENEWABLE ENERGY									
2.1	Support small-scale renewable energy systems	Support	Support	Support	N/A	MN	MN	MN	MN	
2.1.1	Update Zoning Code to remove barriers to these systems									
2.1.2	Implement a solar policy									
2.1.3	Consider pre-wiring and plumbing for these systems									
2.1.4	Create municipal projects which include renewable energy									
2.2	Low-interest financing for renewable energy installations	-8,200	-20,790	-27,280	2015: 50% SCEIP & 25% retrofitted buildings install renew 2020: 60%/25% 2035: 75%/25%	LM	MN	H	H	
2.2.1	Partner with SCEIP to provide financing for solar									
2.2.2	Explore Feed-In Tariff to spur renewable energy installation									
2.3	50% increasing to 70% of Santa Rosa's energy from renewable sources	-22,180	-56,040	-58,240	2015: 35% renewable power 2020: 50% 2035: 70%	MH	MN	MN	MN	
2.3.1	Set renewable power generation goal by Council resolution									
2.3.2	PG&E increase in use of renewable energy sources									
2.3.3	Explore cost of Community Choice Aggregation									
2.3.4	Evaluate feasibility of mid-size renewable projects in city									
3	MANAGE PARKING SUPPLY									
3.1	Increase jobs and housing density downtown & near transit	-5,450	-11,680	-10,780	2015, 20, 35: 15% of development is denser	UN	UN	MN	H	
3.1.1	Support Urban Growth Boundary									
3.1.2	Implement station plans, specific plans, corridor plans									

#	Short Description	Emissions Reduction			Performance Target	CITY*		COMMUNITY*		Priority
		2015	2020	2035		Cost	Saving	Cost	Saving	L, M, H
3.2	Complementary land uses to decrease need for vehicle travel	-320	-6,270	-7,840	2015, 20, 35: 20% of development is downtown	UN	UN	MN	MH	
3.2.1	Work with employers to provide on-site services									
3.2.2	Improve non-vehicular network to promote walking, biking									
3.2.3	Support mixed-use, higher-density development near services									
3.3	Support development of affordable housing	-320	-960	-1,480	2015, 20, 35: 5% of housing is affordable	MN	MN	MN	MH	
3.3.1	Provide affordable housing near transit									
3.3.2	Implement the Housing Allocation Plan									
3.4	Limit free parking in high traffic areas	-4,810	-12,030	-16,840	2015, 20, 35: 10% of parking will be efficiently priced	LM	MN	MN	H	
3.4.1	Price on-street parking relative to congestion									
3.4.2	Implement residential permit program; reduce required parking									
3.4.3	Evaluate Zoning Code relative to parking requirements									
3.5	Unbundle price of parking from property costs	-640	-940	-2,220	10% unbundled	MN	MN	MN	MH	
3.5.1	Investigate mechanisms to unbundle parking from rent/property costs for new development									
3.5.2	Implement policy to encourage unbundled parking									
3.6	Provide traffic calming to encourage walking and biking	-320	-800	-740	2015, 20, 35: improve-ments at 20% of ped connections	MH	MN	MN	M	
3.6.1	Install calming features to improve ped/bike experience									
4	INCREASE SAFE, RELIABLE ALTERNATIVES TO VEHICLE TRAVEL									
4.1	Improve the bicycle and pedestrian network	-960	-1,880	-3,690	Percent of	MN	MN	MN	MH	

#	Short Description	Emissions Reduction			Performance Target	CITY*		COMMUNITY*		Priority
		2015	2020	2035		Cost	Saving	Cost	Saving	L, M, H
4.1.1	Implement the Bicycle and Pedestrian Master Plan				bike plan implemented 2015: 10% 2020: 25% 2035: 100%					
4.1.2	Update bicycle parking regulations									
4.1.3	Provide bicycle safety training to residents, employees, motorists									
4.1.4	Continue to support Safe Routes to School and transit programs									
4.1.5	Implement a bike-share program									
4.2	Improve transit to, from, and within Santa Rosa	-1,280	-6,410	-6,410	2015: 5% riders + 2020: 10%+ 2035: 25%+	M	MN	MN	MH	
4.2.1	Provide real-time arrival and departure information									
4.2.2	Provide safe spaces to wait for bus arrival									
4.2.3	Support establishment of SMART rail service									
4.2.4	Explore high frequency/rapid bus along major transit corridors									
4.2.5	Replace bus fleet with GHG-reducing vehicles									
4.2.6	Evaluate system performance to maximize transit trips provided									
4.2.7	Evaluate measure to increase transit ridership									
4.3	Increase shared vehicle and transit trips	-320	-4,010	-4,010	2015: 2%+ 2020: 25%+ 2035: 25%+	LM	MN	MN	MH	
4.3.1	Establish a car-sharing operation in Santa Rosa									
4.3.2	Work with large employers to provide rideshare programs									
4.3.3	Consider expanding employee programs promoting transit use									
4.3.4	Provide awards for employee use of alternative commute options									

#	Short Description	Emissions Reduction			Performance Target	CITY*		COMMUNITY*		Priority
		2015	2020	2035		Cost	Saving	Cost	Saving	L, M, H
4.3.5	Encourage new employers of 50+ to provide subsidized transit passes									
4.3.6	Work with local school districts, SRJC to provide subsidized passes									
4.3.7	Identify locations for additional park-and-ride lots									
4.4	Consider Car-Free Sunday demonstration for use of streets	Support	Support	Support	car-free Sundays	UN	UN	UN	UN	
4.4.1	Designate some Sundays as car-free in different neighborhoods									
4.5	Encourage remote work centers and telecommuting	-520	-830	-1,850	2015: 3% 1 day/2 wks 2020: 5% 2035: 10% 2015, 20, 35: 2% new	MN	MN	MN	MN	
4.5.1	Promote workplace alternatives, including telecommuting									
5	INCREASE USE OF ALTERNATIVELY FUELED VEHICLES									
5.1	Facilitate use of electric and hybrid vehicles	-1,240	-2,600	-26,430	EV charging spaces	LM	M	MH	M	
5.1.1	Provide electric recharging stations in City facilities/lots									
5.1.2	Require new parking lots to include electric vehicle recharging									
5.1.3	Allow EV charging stations in larger parking lots									
5.1.4	Provide priority parking for electric hybrid vehicles in City lots									
5.1.5	Consider rebates for employee purchase of electric vehicles									
5.1.6	Expand electric vehicle charging network									
5.2	Support Low Carbon Fuel Standard & alternative fuels	-17,280	-52,480	-86,350	Number of fueling	UN	UN	UN	UN	
5.2.1	Require new fueling stations to provide alternative fuels									

#	Short Description	Emissions Reduction			Performance Target	CITY*		COMMUNITY*		Priority
		2015	2020	2035		Cost	Saving	Cost	Saving	L, M, H
5.2.2	Offer guidance about diesel-to-biodiesel conversions				stations with alternative fuels					
5.2.3	Develop tri-generation fuel cell for City/public vehicles									
5.2.4	Develop alternative fueling stations in Santa Rosa									
5.2.5	Increase participation in SRJC alternative fuel classes									
5.3	Limit vehicle idling	-900	-2,140	-4,340	2015: 10% decrease truck idling/15% school 2020: 25/35% 2035: 40/75%	L	MN	MN	MH	
5.3.1	Work with law enforcement to enforce state idling rules									
5.3.2	Shut off cars when waiting to pick up children at school									
5.3.3	Consider amending Zoning Code to prohibit new drive-through facilities									
5.4	Facilitate use of neighborhood electric vehicles (NEVs)	-560	-2,630	-4,950	2015: 500 new NEV 2020: 2,500 2035: 5,000	M	MN	H	MH	
5.4.1	Identify streets appropriate for NEV use									
5.4.2	Create a NEV street network									
5.4.3	Explore rebates for purchases of NEV									
5.4.4	Develop a map and signage for NEV network									
6	REDUCE SOLID WASTE SENT TO LANDFILL FROM SANTA ROSA									
6.1	Increase recycling and composting of waste	-25,170	-64,370	-129,720	2010: 68% diversion 2015: 75% 2020: 85% 2035: 95%	MN	MN	MN	MN	
6.1.1	Increase waste accepted for curbside recycling									
6.1.2	Encourage composting of restaurant waste and compostable/recyclable containers									
6.1.3	Increase diversion of construction waste									
6.2	Reduce use of non-recyclable materials	Support	Support	Support	2010: 68% diversion	MN	MN	MN	MN	
6.2.1	Discourage use of styrofoam and plastic bags									

#	Short Description	Emissions Reduction			Performance Target	CITY*		COMMUNITY*		Priority
		2015	2020	2035		Cost	Saving	Cost	Saving	L, M, H
6.2.2	Reduce amounts of packaging used				2015: 75% 2020: 85% 2035: 95%					
6.2.3	Discourage use of bottled water at City events									
6.2.4	Divert 75% of waste by 2020									
7	IMPROVE WATER & WASTEWATER EFFICIENCY									
7.1	Conserve water	-1,170	-1,700	-2,210	2010: 130 gal/day 2015: 125 gal/day 2020: 122 gal/day 2035: 110 gal/day	M	MN	M	H	
7.1.1	Require reduction in potable water for new development									
7.1.2	Expand water conservation efforts									
7.1.3	Use water meters which track real-time water use									
7.1.4	Utilize smart water meters to save water and costs									
7.2	Improve efficiency of water/wastewater facilities	-1,240	-2,050	-3,960	2015: 10% energy savings 2020: 15% savings 2035: 35%	MH	LM	MN	MN	
7.2.1	Provide recycled water to Geysers to generate clean energy									
7.2.2	Install innovative renewable energy projects at treatment plant									
7.3	Increase use of recycled water in Santa Rosa	Support	Support	Support	2015: 350 acre-feet 2020: 350 2035: 1,100	H	MN	MN	MN	
7.3.1	Expand infrastructure network to deliver recycled water									
7.3.2	Meet on-site meter separation requirements in some new development									
8	IMPROVE EFFICIENCY OF AGRICULTURE OPERATIONS									
8.1	Increase amount of food grown and consumed locally	Support	Support	Support		MN	MN	MN	MN	
8.1.1	Incentivize residential agriculture									
8.1.2	Promote growing of fruits/vegetables in front yards									

#	Short Description	Emissions Reduction			Performance Target	CITY*		COMMUNITY*		Priority
		2015	2020	2035		Cost	Saving	Cost	Saving	L, M, H
8.1.3	Establish community gardens and urban farms									
8.1.4	Revise Zoning Code to allow small animals, chickens, bees									
8.1.5	Promote Slow Food campaign for restaurants/wineries									
9	REDUCE EMISSIONS FROM CONSTRUCTION & LAWN/GARDEN EQUIPMENT									
9.1	Encourage use of electric lawn and garden equipment	-10	-20	-50	2015: 10% electric 2020: 25% 2035: 50%	MN	MN	MN	MN	
9.1.1	Re-establish voluntary exchange of gas mowers/blowers									
9.1.2	Require provision of outside outlets									
9.1.3	Replace high water use landscapes									
9.2	Reduce construction equipment emissions	-350	-360	-450	2015, 20, 35: 40% idling reduction	MN	MN	MN	MN	
9.2.1	Minimize idling time to 5 minutes or less									
9.2.2	Maintain construction equipment per manufacturer's specs									
9.2.3	Limit GHG construction equipment emissions with measures									

* Cost/Savings abbreviations: MN = Minimal; L = Low; LM = Low-Mid; M = Medium; MH = Medium-High; H = High

MONITORING AND UPDATING THIS PLAN

The City will use the implementation matrix, as well as the implementation and monitoring tool, to track, monitor, and update the Climate Action Plan. As the City reports on progress in implementing the CAP, staff will evaluate the effectiveness of each measure to ensure that the anticipated GHG reductions are occurring. In the event that GHG reductions do not occur as expected, the City will be able to modify and add further policies to the CAP to ensure the City meets the local reduction target.

CHAPTER 7 –
GLOSSARY

City of Santa Rosa
Community Development

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7. GLOSSARY

Air Basin: A land area with generally similar meteorological and geographic conditions throughout. To the extent possible, air basin boundaries are defined by CARB along political boundary lines and include both the source and receptor areas. California is currently divided into 15 air basins.

Air Pollutants: Amounts of foreign and/or natural substances occurring in the atmosphere that may result in adverse effects to humans, animals, vegetation, and/or materials.

American Recovery and Reinvestment Act (ARRA): Commonly referred to as the Stimulus Plan or Recovery Act, ARRA is an economic stimulus package enacted by the federal government in 2009. The intent of the stimulus is to create jobs and promote investment and consumer spending during the economic recession.

Assembly Bill (AB) 32, California Global Warming Solutions Act of 2006: Establishes a comprehensive program of regulatory and market mechanisms to achieve real, quantifiable, cost-effective reductions of greenhouse gases (GHG) for the State of California. AB 32 designates the California Air Resources Board (CARB) as the responsible agency for monitoring and reducing statewide GHG emissions to reduce emissions to 1990 levels by 2020.

Assembly Bill (AB) 811: Authorizes all cities and counties in California to designate areas within which willing property owners may finance the installation of distributed renewable energy generation, as well as energy efficiency improvements, through low-interest loans. These financing programs are commonly referred to as Property Assessed Clean Energy, or PACE, programs.

Assembly Bill (AB) 939: Establishes a goal of achieving a statewide waste diversion rate of 50% and requires cities and counties to divert a minimum of 50% of their waste stream for reuse or recycling.

Assembly Bill (AB) 1881: Requires local agencies to adopt a water-efficient landscape ordinance, limiting the amount of water used for landscaping purposes.

Association of Bay Area Governments (ABAG): The regional planning agency for the 9 counties and 101 incorporated cities in the San Francisco Bay Area.

Buildout; Build-out: Development of land to its full potential or theoretical capacity as permitted under current or proposed planning or zoning designations.

Business-As-Usual (BAU): A business-as-usual projection forecasts greenhouse gas emissions without regulatory or technical intervention to reduce GHG emissions.

California Air Resources Board (CARB): A division of the California Environmental Protection Agency charged with protecting public health, welfare, and ecological resources through the reduction of air polltants.

California Climate Adaptation Strategy (CAS): Summarizes the best-known science on climate change impacts to California and provides recommendations on how to manage the risks.

California Environmental Quality Act (CEQA): A state law requiring state and local agencies to regulate activities with consideration for environmental protection. If a proposed activity has the potential for a significant adverse environmental impact, an environmental impact report (EIR) must be prepared and certified as to its adequacy before action can be taken on the proposed project. General plans require the preparation of a program EIR.

California Green Building Standards Code (CALGreen): The 2010 California Green Building Standards Code, commonly referred to as the CALGreen Code, is a statewide mandatory construction code that was developed and adopted by the California Buildings Standards Commission and the Department of Housing and Community Development. The CALGreen standards require new residential and commercial buildings to comply with mandatory measures under the topics of planning and design, energy efficiency, water efficiency and conservation, material conservation and resource efficiency, and environmental quality. CALGreen also provides voluntary tiers and measures that local governments may adopt that encourage or require additional measures in the five green building topics.

California Solar Initiative (CSI): Allows the California Public Utilities Commission (CPUC) to provide incentives to install solar technology on existing residential, commercial, nonprofit, and governmental buildings if they are customers of the state's investor-owned utilities: Pacific Gas & Electric (PG&E), San Diego Gas & Electric (SDG&E), or Southern California Edison (SCE).

Carbon Dioxide (CO_2): A colorless, odorless gas that occurs naturally in the earth's atmosphere. Significant quantities are also emitted into the air by fossil fuel combustion.

Carbon Dioxide Equivalent (CO_2e): A metric measure used to compare the emissions from various greenhouse gases based on their global warming potential (GWP).The carbon dioxide equivalent for a gas is derived by multiplying the tons of the gas by the associated GWP.

Carbon Sequestration: The process through which agricultural and forestry practices remove carbon dioxide (CO_2) from the atmosphere. The term "carbon sinks" is also used to describe agricultural and forestry lands that absorb CO_2.

Car Sharing: A type of car rental where people rent cars for short periods of time, often by the hour.

Clean Air Act: Requires the EPA to set National Ambient Air Quality Standards for six common air pollutants, known as "criteria pollutants," that are found all over the United States: particle pollution (particulate matter), ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead. The EPA regulates the pollutants by developing human health-based and/or environmentally based criteria (science-based guidelines) for setting permissible levels.

Clean Car Fuel Standards (AB 1493, Pavley): Signed into law in 2002 and commonly referred to as Pavley standards. Require carmakers to reduce GHG emissions from new passenger cars and light trucks beginning in 2011. CARB anticipates that the Pavley standards will reduce GHG emissions from new California passenger vehicles by about 22% in 2012 and about 30% in 2016, all while improving fuel efficiency and reducing motorists' costs.

Climate Action Plan (CAP): Strategic plans that establish policies and programs for reducing (or mitigating) a community's greenhouse gas (GHGs) emissions and adapting to the impacts of climate change.

Climate Change (also referred to as global climate change): The term "climate change" is sometimes used to refer to all forms of climatic inconsistency, but because the earth's climate is never static, the term is more properly used to imply a significant change from one climatic condition to another. In some cases, climate change has been used synonymously with the term "global warming"; scientists, however, tend to use the term in the wider sense to also include natural changes in climate.

Climate Change Adaptation: The adjustment in natural or human systems to respond to actual or expected climate changes to minimize harm or take advantage of beneficial opportunities.

Climate Change Mitigation: A technical or behavioral intervention to reduce the sources of greenhouse gas emissions in order to reduce the potential effects of climate change.

Climate Zone: The California Energy Commission has classified the distinct climates throughout California by climate zone to recognize the variability in energy use based on local weather patterns. The Energy Commission uses these climate zones to determine energy budgets for new and renovated buildings and prescriptive packages for each climate zone to ensure that they meet the State's Title 24 energy efficiency standards.

Co-Benefits: An additional benefit occurring from the implementation of a GHG reduction measure that is not directly related to reducing greenhouse gas emissions. In this document, the co-benefits are defined as follows:



Conserves Energy | Improves Air Quality | Improves Public Health | Supports Local Economy | Reduces Water Use | Provides Educational Opportunities | Provides Monetary Savings | Implements State Policy | Improves Mobility

Complete Streets: Complete Streets policies ensure that transportation planners and engineers consistently design and operate the entire roadway with all potential users in mind. This includes bicyclists, public transportation vehicles and riders, and pedestrians of all ages and abilities. In 2007, the State of California adopted AB 1358, which directs the legislative body of a city or county, upon revision of the circulation element of its general plan, to identify how the jurisdiction will provide for the routine accommodation of all users

Compressed Natural Gas (CNG): A fossil-fuel substitute for gasoline, diesel, or propane that can be used in passenger and heavy-duty vehicles.

Conservation: Planned management of a natural resource to prevent exploitation, destruction, or neglect.

Construction and Demolition Waste (C&D): C&D materials consist of the waste generated during the construction, demolition, or renovation of buildings, roads, and other construction projects. C&D materials may include heavy, bulky materials such as concrete, glass, wood, and metal, among other materials.

Distributed Energy Resources (DER): Small, modular, energy generation and storage technologies that provide electric capacity or energy located where it's needed. DERs typically produce less than 10 megawatts (MW) of power and include wind turbines, photovoltaic (PV), fuel cells, micro turbines, reciprocating engines, combustion turbines, cogeneration, and energy storage systems. DER systems may be either connected to the local electric power grid or isolated from the grid in stand-alone applications.

Emission Standard: The maximum amount of pollutant legally permitted to be discharged from a single source, either mobile or stationary.

Energy Conservation: Reducing energy waste, such as turning off lights, heating, and motors when not needed.

Energy Efficiency: Doing the same or more work with less energy, such as replacing incandescent light bulbs with compact fluorescent light bulbs or buying an Energy Star appliance to use less energy for the same or greater output.

Energy Efficiency and Conservation Block Grant (EECBG): The EECBG program was funded through the American Recovery and Reinvestment Act and is managed by the Department of Energy to assist cities, counties, states, and territories to develop, promote, and implement energy efficiency and conservation programs and projects.

Energy Efficiency Standards (Title 24, Part 6): Title 24 standards were first adopted in 1978 and established minimum energy efficiency standards for residential and non-residential buildings. These standards are updated continually by providing more stringent energy budgets for new buildings in an effort to reduce California's energy consumption.

Energy Star: A joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy to provide consumers with information and incentives to purchase the most energy-efficient products available.

Energy Star Portfolio Manager: An online management tool that allows non-residential building owners and tenants to track and assess energy and water use over time. Benchmarking energy and water use allows building owners to identify investment priorities, determine underperforming buildings, and verify efficiency improvements.

Environment: In CEQA, "the physical conditions which exist within the area which will be affected by a proposed project, including land, air, water, mineral, flora, fauna, noise, and objects of historic or aesthetic significance."

Environmental Impact Report (EIR): A report required by the California Environmental Quality Act (CEQA) that assesses all the environmental characteristics of an area and determines what effects or impacts will result if the area is altered or disturbed by a proposed action or project. See California Environmental Quality Act (CEQA).

Environmentally Preferable Purchasing (EPP): California law requires state government to practice environmentally preferable purchasing, which is the procurement of goods, and services that have a reduced impact on human health and the environment as compared to other goods and services serving the same purpose.

Feasible: Capable of being accomplished in a successful manner within a reasonable time taking into account economic, environmental, social, and technological factors.

Feed-In Tariff (FIT): A market mechanism designed to encourage the installation of renewable energy by setting a fixed rate for excess energy generated through local renewable energy systems and fed back into the grid for distribution and other uses.

Fossil Fuel Facilities: Include, but are not limited to, oil and gas wells, separators, and refineries.

Global Warming Potential (GWP): An index used to translate the level of emissions of various gases into a common measure in order to compare the relative potency of different gases without directly calculating the changes in atmospheric concentrations. Greenhouse gases are expressed in terms of carbon dioxide equivalent. Global warming potentials are expressed in terms relative to carbon dioxide, which has a global warming potential of 1.

Graywater: Wastewater collected from showers, bath tubs, bathroom sinks, and clothes washing machines that is reused on-site for irrigation purposes.

Green Building: Sustainable or "green" building is a holistic approach to design, construction, and demolition that minimizes the building's impact on the environment, the occupants, and the community. See the California Green Building Standards Code for green building regulations in California.

Greenhouse Gas or Greenhouse Gases (GHG): Gases which cause heat to be trapped in the atmosphere, warming the earth. Greenhouse gases are necessary to keep the earth warm, but increasing concentrations of these gases are implicated in global climate change. Greenhouse gases include all of the following: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. The majority of greenhouse gases come from natural sources, although human activity is also a major contributor.

Greenhouse Gas Inventory: A greenhouse gas (GHG) inventory provides estimates of the amount of GHGs emitted to and removed from the atmosphere by human activities. A city or county that conducts an inventory looks at both community emission sources and emissions from government operations. A base year is chosen and used to gather all data from that year. Inventories include data collection from such things as vehicle miles traveled (VMT), energy usage from electricity and gas, and waste. Inventories include estimates for carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs), which are referred to as the six Kyoto gases.

Green Waste: Refers to lawn, garden, or park plant trimmings and materials and can be used in home composters or picked up curbside by municipal waste haulers.

Indicator: Types of data or information that can be used to determine the progress or success of each reduction measure.

LEED: Leadership in Energy and Environmental Design, a standard established by the U.S. Green Building Council.

Level of Service (LOS) Standard: A standard used by government agencies to measure the quality or effectiveness of a municipal service such as police, fire, or library, or the performance of a facility, such as a street or highway.

Life-Cycle Costing (LCC): The process of evaluating the total overall costs and benefits of buildings or equipment over time, including initial costs of design and construction; operating costs; long-term costs of maintenance, repair, and replacement; and other environmental or social costs over its full life, rather than simply based on purchase cost alone.

Light-Emitting Diode (LED): A lower energy consuming and longer-lasting alternative to incandescent and compact fluorescent light bulbs.

Low Carbon Fuel Standard (S-1-07): An executive order from former Governor Schwarzenegger, the Low Carbon Fuel Standard established the goal of reducing the carbon intensity of transportation fuels in California by 10% by 2020.

Low Impact Development (LID): An innovative stormwater management approach with a basic principle to design the built environment to remain a functioning part of an ecosystem rather than exist apart from it. LID's goal is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source.

Metropolitan Planning Organization (MPO): A federally funded transportation planning organization comprising representatives from local government agencies and transportation authorities. See Association of Bay Area Governments (ABAG) for more information on the local MPO.

Mixed Use: Properties on which various uses such as office, commercial, institutional, and residential are combined in a single building or on a single site in an integrated development project with significant functional interrelationships and a coherent physical design. A single site may include contiguous properties.

National Ambient Air Quality Standards: The prescribed level of pollutants in the outside air that cannot be exceeded legally during a specified time in a specified geographical area.

Native Species: A species within its natural range or natural zone of dispersal, i.e., within the range it would or could occupy without direct or indirect introduction and/or care by humans.

Neighborhood Electric Vehicle (NEV): Small, battery-powered, low-speed electric vehicles. NEVs are typically limited to streets with a posted speed limit of 25 mph or less. NEVs are classified by

the California Air Resources Board as zero emissions vehicles, as they do not produce any tailpipe emissions.

Nonattainment: The condition of not achieving a desired or required level of performance. Frequently used in reference to air quality.

Non-Renewable Energy: Energy from sources that use a non-renewable natural resource such as uranium or fossil fuels such as coal, oil, or natural gas.

Operations and Maintenance (O&M): Refers to the activities related to the routine, preventive, predictive, scheduled, and unscheduled actions aimed at preventing equipment failure or decline with the goal of increasing efficiency, reliability, and safety.

Ordinance: A law or regulation set forth and adopted by a governmental authority, usually a city or county.

Ozone: Produced when gases or vapors created by cars, solvents, factories, and pesticides mix and react in the presence of sunlight. This results in certain health effects such as breathing difficulties, lung damage, coughing, and chest pains.

Particulate Matter (PM_{10}) and Fine Particulate Matter ($PM_{2.5}$): Fine mineral, metal, smoke, soot, and dust particles suspended in the air. In addition to reducing visibility, particulate matter can lodge in the lungs and cause serious, long-term respiratory illness and other health problems. The smaller the size of the particle, the deeper it can penetrate into the lungs and the more difficult it is to expel.

Preservation: To keep safe from injury, harm, or destruction.

Property Assessed Clean Energy (PACE): See Assembly Bill 811.

Recycled Water: Wastewater from tubs, toilets, and sinks inside homes and offices that is cleaned through a treatment process, producing a non-potable water that is safe for landscapes, raw vegetable crops, and agricultural crops.

Reduction Measure: A goal, strategy, program, or set of actions that target and reduce a specific source of greenhouse gas emissions.

Regional Transportation Plan: A long-term blueprint of the region's transportation systems. The RTP is a federally mandated comprehensive long-range regional planning document that identifies the region's transportation needs, sets forth an action plan of projects, determines actions and programs to address the needs and issues, and documents the financial resources needed to implement the RTP.

Renewable Energy: Energy from sources that regenerate and are less damaging to the environment, such as solar, wind, biomass, and small-scale hydroelectric power.

Renewable Portfolio Standard (RPS): A regulation requiring utility companies in California to increase the production of renewable energy from solar, wind, or biomass, or geothermal sources.

Retrofit Upon Sale: Requirements on real property to replace inefficient water or energy fixtures as a condition of escrow. Retrofit upon sale requirements typically require a certificate or other form of verification from local government agencies to ensure that the fixtures are replaced and meet minimum efficiency requirements.

Safe Routes to School (SR2S or SRTS): A national movement aimed at providing safe environments to encourage walking and bicycling surrounding local schools through engineering, enforcement, education, encouragement, and evaluation. Safe Routes to School programs are typically funded through federal, state, and local grants. SR2S is the California program; SRTS is the national program.

Scopes: Scopes help to identify where emissions originate and what entity retains regulatory control and the ability to implement efficiency measures. The scopes are defined as follows:

> ***Scope 1*** – Direct emissions sources located within Santa Rosa, primarily from combustion of fuels. Examples of Scope 1 sources include the use of fuels such as gasoline or natural gas. GHG emissions from off-road agriculture equipment and nitrogen fertilizer application are considered Scope 1 emissions, while methane emissions from livestock are considered Scope 3.
>
> ***Scope 2*** – Indirect emissions that result because of activities in Santa Rosa and limited to electricity, district heating, steam, and cooling consumption. Scope 2 emissions sources include purchased electricity used in the city and associated with the generation of greenhouse gas emissions at the power plant. These emissions should be included in community-wide analysis, as they are the result of the community's electricity consumption.
>
> ***Scope 3*** – All other indirect emissions that occur as a result of activity in the city. Examples of Scope 3 emissions include methane emissions from solid waste generated within the community, which decomposes at landfills either inside or outside of Santa Rosa.

Senate Bill (SB) X7-7: Passed in 2009, SB X7-7 requires the state to achieve a 20% reduction in per capita water use by 2020. This law also requires local water providers to set an interim 2015 and a final 2020 community-wide target and demonstrate that projected water use is in compliance with that target, otherwise funding will be affected.

Senate Bill (SB) 97: Requires lead agencies to analyze GHG emissions and climate change impacts under the California Environmental Quality Act.

Senate Bill (SB) 375: Directs the metropolitan planning organizations in California to create a Sustainable Communities Strategy as part of the Regional Transportation Plan. The SCS will demonstrate how the region will achieve the 2020 and 2035 GHG reduction targets for the region set by CARB.

Senate Bill (SB) 407: Adopted in 2010, SB 407 requires inefficient indoor plumbing fixtures be replaced with more efficient models by 2014. Starting in 2017, at the time of single-family property sale and 2019 for multi-family sales, the seller must disclose inefficient indoor plumbing fixtures.

Senate Bill (SB) 610 (Chaptered at Water Code 10910): Requires proposed projects subject to CEQA to include a water supply assessment that proves that adequate water exists for the project.

Senate Bill (SB) 1016: Adopted in 2008, SB 1016 establishes per capita waste disposal rate requirements and goals for local agencies in California. The requirements are expressed in a pounds per person per day measurement.

Smart Grid: The smart grid delivers electricity from suppliers to consumers using two-way digital communications. The smart grid is envisioned to overlay the ordinary electrical grid with an information and net metering system, which includes smart meters. Smart meters will allow consumers to become more aware of their energy use and in the future will allow smart grid enabled appliances to be pre-programmed to operate at a time when electricity costs are lowest.

Sustainability: Community use of natural resources in a way that does not jeopardize the ability of future generations to live and prosper.

Sustainable Communities Strategy (SCS): The land use element of each MPO's Regional Transportation Plan as required by SB 375. The SCS will demonstrate how the region will achieve the 2020 and 2035 VMT and GHG reduction targets for the region set by CARB.

Sustainable Development: Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Transit-Oriented Development (TOD): A mixed-use residential or commercial area designed to maximize access to transit options.

Transportation Demand Management (TDM) Plan: A voluntary or mandatory program developed by local agencies, large employers, or high traffic commercial services to limit the amount of congestion and pollution related to transportation demand. TDM plans may include incentives, regulations, and education about transportation alternatives.

Unbundled Parking: A parking strategy in which parking spaces are rented or sold separately, rather than automatically included with the rent or purchase price of a residential or commercial unit.

Urban Heat Island: The term "heat island" describes built-up areas that are hotter than nearby rural areas. On a hot, sunny summer day, roof and pavement surface temperatures can be 50– 90°F (27–50°C) hotter than the air, while shaded or moist surfaces remain close to air temperatures. These surface urban heat islands, particularly during the summer, have multiple impacts and contribute to atmospheric urban heat islands. Heat islands can affect communities by increasing summertime peak energy demand, air conditioning costs, air pollution and greenhouse gas emissions, heat-related illness and mortality, and water quality.

Urban Reserve: An area outside of an urban service area but within an urban growth boundary, in which future development and extension of municipal services are contemplated but not imminent.

Vehicle Miles Traveled (VMT): A key measure of overall street and highway use. Reducing VMT is often a major objective in efforts to reduce vehicular congestion and achieve regional air quality goals.

Volatile Organic Compounds (VOC): A variety of chemicals with both short- and long-term adverse health effects. VOCs are emitted as gases from a wide array of products such as paints, lacquers, cleaning supplies, markers, and office equipment and furnishings.

Vulnerable Populations: There are three primary segments of vulnerable populations: those at risk to adverse climate change impacts due to exposure, sensitivity, or adaptive capacity.

> ***Exposure:*** Physical conditions may put particular populations at risk to the impacts of climate change. For instance, populations living in low-lying or coastal areas may be more exposed to flooding events and sea level rise, while those who work outside may suffer from health-related issues due to increased temperatures and decreased air quality.
>
> ***Sensitivity:*** Certain populations, including young children and those over the age of 65, are physiologically more sensitive to extreme temperatures and increased instances of air pollution.
>
> ***Adaptive Capacity:*** The adaptive capacity of lower-income and institutionalized populations can be limited due to lower access to the resources necessary to prepare for or react to the long-term impacts of climate change and the increased frequency of disasters.

Water Conservation: Reducing water use, such as turning off taps, shortening shower times, and reducing outdoor irrigation demand.

Water-Efficient Landscape: Native or low-water-using landscapes. Water-efficient landscapes are required by law in all cities and counties in California to conserve water.

Water Use Efficiency: Replacing older technologies and practices in order to accomplish the same results with less water, for example, by replacing toilets with new high efficiency models and by installing "smart controllers" in irrigated areas.

Zero Emissions Vehicle (ZEV): A vehicle that does not emit any tailpipe emissions from the on-board source of power. Both electric and hydrogen fuel cell vehicles are classified as ZEVs.

APPENDIX A –
BASELINE GHG INVENTORY

City of Santa Rosa
Community Development

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APPENDIX A: BASELINE GHG INVENTORY

This technical assessment summarizes the preliminary results of three key milestone tasks of the City's GHG reduction planning process: (1) inventorying baseline GHG emissions, (2) forecasting GHG emissions, and (3) setting GHG emissions reduction target(s). Specifically, this memo presents the findings and recommendations of the following:

- 2007 Baseline Community-Wide GHG Inventory
- 2007 Baseline Municipal Operations GHG Inventory
- 2015, 2020, and 2035 Community-Wide GHG Inventory Forecasts
- City's adopted GHG reduction targets
- Additional GHG reduction targets

The community-wide and municipal operations inventory will act as a foundation for the City's Climate Action Plan by informing the City and community of the largest sources of GHG emissions, and thus the largest opportunities for reduction. The community-wide inventory and municipal operations inventory and forecasts have been developed as part of the current GHG reduction program.

The purpose of the GHG emissions inventory is to present the major sources and quantities of GHG emissions caused by activities within the Urban Growth Boundary of Santa Rosa and as the result of City government operations. The inventory will provide a baseline against which future progress can be measured and serve as the foundation for the City's Climate Action Plan.

Specifically, the inventory does the following:

- Presents GHGs from community-wide activities in calendar year 2007;
- Details GHGs from City government facilities and operations in calendar year 2007;
- Forecasts how community-wide emissions will increase by 2015, 2020, and 2035 if no behavioral or regulatory changes are made (known as a business-as-usual scenario);
- Adjusts the GHG forecasts to account for reduction efforts mandated by the State of California (State), such as new vehicle standards and fuel standards; and
- Provides City decision-makers with adequate information to direct development of a Climate Action Plan (CAP) and establish additional emission reduction targets, if desired.

The inventory includes the major sources of GHGs caused by activities in the city[14] and by the City per best practice and consistent with the methodology recommended by the California Air Resources Board (CARB), ICLEI-Local Governments for Sustainability, and the Bay Area Air Quality Management District (BAAQMD). The inventory analyzes the following emissions sources:

- **Energy** – Electricity and natural gas consumed in Santa Rosa in 2007.
- **Transportation** – Vehicle miles traveled (VMT) to and/or from Santa Rosa in 2007.
- **Waste** – Methane emissions from waste sent to landfills from the community in 2007.
- **Water and Wastewater** – The energy required to extract, filter, move, and treat the water consumed and/or treated in Santa Rosa in 2007. Direct process emissions from the City's wastewater treatment facilities and fugitive emissions from septic tanks in the city.[15]
- **Stationary Source** – Direct emissions from industrial processes in Santa Rosa that are permitted by the Bay Area Air Quality Management District.
- **Off-Road** – Emissions from construction and lawn and garden off-road equipment/vehicles.
- **Agriculture** – Emissions from fertilizer and agricultural off-road equipment/vehicles.

DATA PARAMETERS

The inventory was developed with the best-available tools, data, and methodology; however, as with any GHG inventory, there are limitations to representing all sources of emissions in a local jurisdiction. The main factors that limit GHG inventories include (1) data availability, (2) privacy laws, and (3) deficient methodology. The following sections highlight emissions that cannot be included in a GHG inventory due to these factors. It is estimated that sources not included in the inventory for reasons of data availability and privacy laws comprise less than 5% of total emissions in the city and are therefore anticipated to have a minimal impact. The emissions excluded for reasons of deficient methodology may be considerable, but it is not possible to estimate their impact on Santa Rosa's inventory under current methodological constraints.

1. Data Availability

Lack of available data prevented the calculation of emissions from the following sources for the following reasons:

- Propane use – Propane is essentially an unregulated fuel in California (except for storage and safety issues, which are regulated). Because it is an unregulated commodity, no data is collected by the State on propane sales or usage. Santa Rosa is an urbanized community

[14] In this document, "city" refers to the area within Santa Rosa's urban growth boundary while "City" refers to Santa Rosa government operations.

[15] According to the Local Government Operations Protocol, "Fugitive emissions that are not physically controlled but result from intentional or unintentional releases, commonly arising from the production, processing, transmission, storage, and use of fuels and other substances, often through joints, seals, packing, gaskets, etc."

with a readily available natural gas system. As such, propane is not anticipated to be widely used and is likely to contribute minimally to community-wide emissions.

- Refrigerants – Similar to propane, above, the amount of fugitive refrigerant emissions cannot be calculated because sales are not tracked.

2. Privacy Laws

Commercial, industrial, and institutional electricity and natural gas are combined into a non-residential category due to the California 15/15 rule. The 15/15 rule was adopted by the California Public Utilities Commission in the Direct Access Proceeding (CPUC Decision 97-10-031) to protect customer confidentiality. The 15/15 Rule requires that any aggregated information provided by the utilities must include at least 15 customers and that a single customer's load must be less than 15% of an assigned category. If the number of customers in the compiled data is below 15, or if a single customer's load is more than 15% of the total data, categories must be combined before the information is released. The rule further requires that if the 15/15 Rule is triggered for a second time after the data has been screened already using the 15/15 Rule, the customer must be dropped from the information provided.

3. Deficient Methodology

An appropriate methodology for estimating life-cycle emissions is still under development and is not recommended for inclusion in a community-wide inventory. Life-cycle emissions are emissions associated with the production and disposal of items consumed by a community (i.e., "cradle-to-grave"). For instance, a life-cycle assessment of vehicle emissions would include those from designing, extracting raw materials, producing, delivering, and disposing of each car in the city. In contrast, this analysis only captures how much that car is driven in the city consistent with standard protocol.

Review of similar inventories, including the California Greenhouse Gas Inventory prepared by the California Air Resources Board, indicates that those sources not included in the inventory for the reasons stated above comprise less than 5% of total emissions in the city. The emissions identified in this report are primarily GHGs that the community has directly caused and has the ability to reduce through implementation of conservation actions, a GHG Reduction Strategy, or corresponding efforts.

BASELINE COMMUNITY-WIDE GHG INVENTORY

This inventory includes Scope 1, Scope 2, and Scope 3 sources from the following sectors: residential energy, non-residential energy, transportation, off-road equipment, water, wastewater, solid waste, stationary sources, and agriculture. These scopes are discussed in further detail below.

Scope 1. Direct emissions caused by activities in the city in 2007 and emitted within the city. Examples of Scope 1 sources include the combustion of fuels such as gasoline and natural gas.

Scope 2. Indirect emissions are caused by activities within the city in 2007 but emitted outside of the city. Examples of Scope 2 sources include electricity used within the community yet generated at power plants outside of the city. These emissions should be

included in the community-wide analysis, as they are the result of the community's electricity consumption.

Scope 3. All other indirect emissions that occur as a result of activity within the community. An example of a Scope 3 source is methane emissions from solid waste generated in the city in 2007 yet released over the lifetime of the waste. Scope 3 emissions have the greatest amount of variability and are less attuned to the specific community than Scope 1 and 2 sources.

The city emitted approximately 1,349,690 metric tons of carbon dioxide equivalents ($MTCO_2e$) in the baseline year 2007. As shown in **Table A-1** and **Figure A-1**, the transportation sector is the largest contributor at 51%, producing approximately 684,280 $MTCO_2e$ in 2007. Emissions from the residential sector were the next largest contributor, accounting for a combined 19% of the total emissions, producing approximately 259,640 $MTCO_2e$. The non-residential sector accounted for 16% of the total emissions (209,880 $MTCO_2e$), and emissions from solid waste comprised 10% of the total (139,770 $MTCO_2e$). The electricity used to pump and treat water and wastwater, along with the direct methane emissions from wastewater treatment, accounted for 9,840 $MTCO_2e$, or about 1%, of community emissions.Emissions were also inventoried for off-road equipment and agriculture, making up 1% and 0.01% of total emissions, or 17,670 and 170 $MTCO_2e$, respectively.

Table A-1 and **Figure A-1** also include stationary or point source emissions. Stationary source emissions are defined as any fixed emitter of air pollutants, such as power plants, petroleum refineries, petrochemical plants, food processing plants, and other heavy industrial sources. The BAAQMD provided a list of stationary source emissions within the City of Santa Rosa totaling 28,440 $MTCO_2e$, or 2% of total community-wide emissions in 2007. Some of the common stationary source emitters in Santa Rosa include hospitals, colleges, City wastewater and transit facilities, wireless communication facilities, coffee roasters, and automotive repair shops.

Stationary source emissions are discussed in this inventory for informational purposes only, as stationary source emissions are influenced by market forces beyond the City's local influence and are instead best addressed and regulated by the BAAQMD or through federal and state programs. The baseline inventory is intended to guide future local policy decisions that relate to emissions within the City's influence; therefore, stationary source emissions are excluded from all further discussions of this inventory after **Table A-1** and **Figure A-1**.

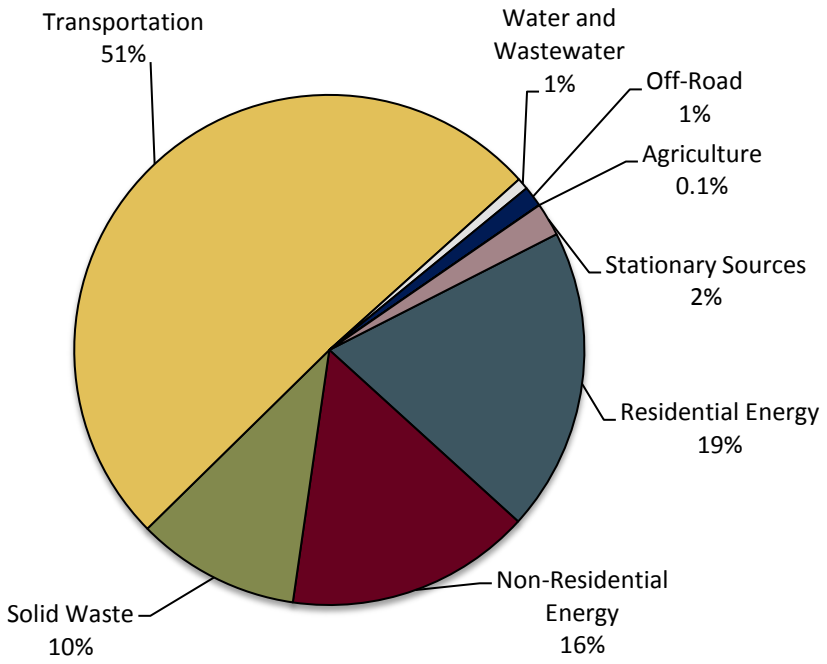
TABLE A-1: 2007 COMMUNITY-WIDE BASELINE EMISSIONS BY SECTOR

Sector	Metric Tons CO_2e/year	Percentage of Total
Residential Energy	259,640	19%
Non-Residential Energy	209,880	16%
Solid Waste	139,770	10%
Transportation	684,280	51%

Sector	Metric Tons CO_2e/year	Percentage of Total
Water and Wastewater	9,840	1%
Off-Road	17,670	1%
Agriculture	170	0.1%
Stationary Sources	28,440	2%
TOTAL*	**1,349,690**	**100%**

** Due to rounding, the total may not be the sum of component parts.*

FIGURE A-1: 2007 COMMUNITY-WIDE BASELINE EMISSIONS BY SECTOR



Excluding stationary sources will allow the City to set accurate emissions reduction targets. The exclusion of stationary sources from local inventories and reduction plans is also supported by the BAAQMD. With stationary sources discounted from the inventory, Santa Rosa emitted approximately 1,321,240 metric tons of CO_2e in 2007. It is unknown whether or how stationary source emissions will change in the future; however, new potential emitters will be approved and noticed by the BAAQMD through current permitting processes.

Additional details on the activities represented in the inventory are provided in **Table A-2** below. **Table A-2** also shows the distribution of emissions without stationary source emitters. The table summarizes activity data units, data sources, and emissions scopes for each sector. **Figure A-2** shows that the majority of emissions are within Scope 1 (70%) and Scope 2 (19%). These emissions were either emitted within the city or directly and immediately caused by activity within the city in 2007. Scope 3 emissions are 11% of the inventory and include emissions that are caused by activity within the city, but are either emitted over long periods or have a higher level of uncertainty than Scope 1 and 2 emissions under best-available methodologies.

FIGURE A-2: GHG EMISSIONS BY SCOPE

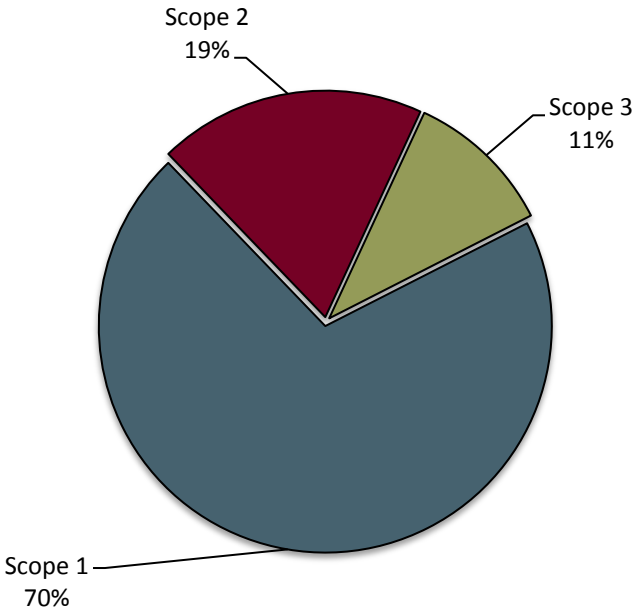


TABLE A-2: COMMUNITY-WIDE DATA SOURCES

Sector	Percentage of Total Emissions	Subsector	Activity	Source	$MTCO_2e$ per Year
Residential Energy	19%	Electricity	365,550 MWh	PG&E	106,920
		Natural Gas	28,386,390 Therms	PG&E	152,720
				Subtotal	259,640
Non-Residential Energy	16%	Electricity	469,670 MWh	PG&E	137,380
		Natural Gas	13,475,990 Therms	PG&E	72,500
				Subtotal	209,880
Solid Waste	10%	Landfilled Waste	176,850 Tons	SCWMA	136,060
		Alternative Daily Cover	7,830 Tons	SCWMA	3,710
				Subtotal	139,770
Transportation	51%	Daily Vehicle Miles Traveled	3,731,117 Miles	SCTA Model, Fehr & Peers	684,280
Water and Wastewater	1%	Water Supply Energy	70 MWh 0 Therms	SCWA, City	20
		Wastewater Treatment Energy	25,800 MWh 36,020 Therms	PG&E, City	7,750
		Wastewater Process Emissions	n/a	City	2,050
		Septic Tank Fugitive Emissions	n/a	City	20
				Subtotal	9,840
Off-Road	1%	Lawn and Garden	–	CARB	650
		Construction	–	CARB	17,020
				Subtotal	17,670
Agriculture	<1%	Off-Road Equipment	740 Acres of Agriculture	CARB	140
		Fertilizer		Ag Commissioner	30
				Subtotal	170
TOTAL*	**100%**				**1,321,250**

** Due to rounding, the total may not be the sum of component parts. Stationary sources are not included because the City lacks primary control over many of these facilities as they are permitted and regulated by the Bay Area Air Quality Management District*

SECTOR DETAIL

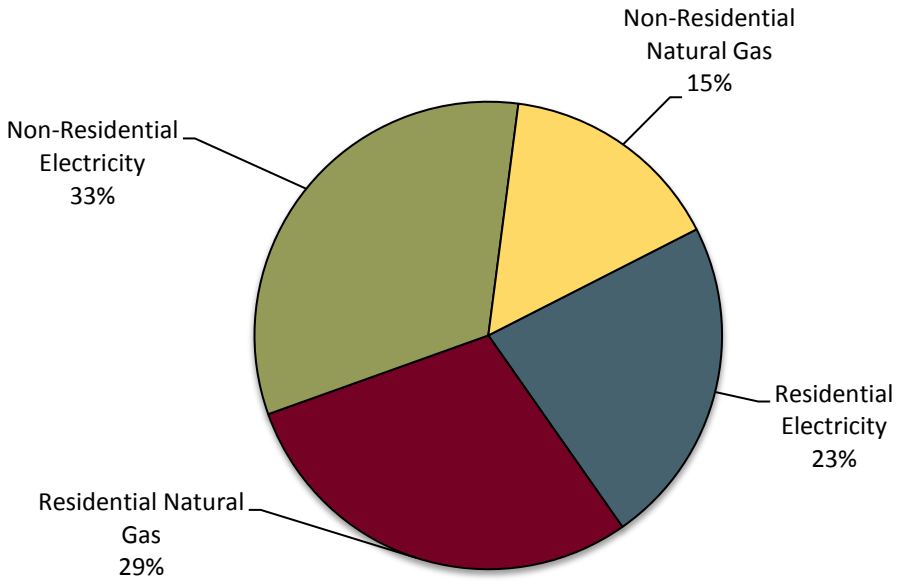
Energy

With all scopes and sectors aggregated, 36% of total community-wide emissions in the year 2007 came from the "built environment" (see residential and non-residential energy sectors in **Table A-2**). The built environment comprises residential, commercial, and industrial natural gas and electricity consumption. As shown in **Figure A-3**, non-residential electricity use makes up 33% of emissions from the built environment, while residential natural gas, residential electricity, and non-residential gas make up 29%, 23%, and 15%, respectively. This analysis does not include emissions from renewable energy installations such as solar, steam, and wind because these energy sources do not cause GHG emissions to be emitted into the atmosphere.

Pacific Gas and Electric Company (PG&E) provided electricity and natural gas consumption on January 6, 2011. Commercial and industrial electricity are combined in the non-residential category due to the California 15/15 rule (see Privacy Laws subsection).

PG&E provided a 2007 carbon dioxide (CO_2) coefficient for electricity and natural gas. Emissions coefficients for methane (CH_4) and nitrogen dioxide (N_2O) emissions were provided by the California Air Resources Board's Local Government Operations Protocol (LGOP) version 1.1 and were converted into carbon dioxide equivalents and added to the CO_2 coefficient to create a CO_2e coefficient.

FIGURE A-3: BUILT-ENVIRONMENT GHG EMISSIONS BY SECTOR (REPRESENTS 35% OF COMMUNITY-WIDE GHG EMISSIONS)

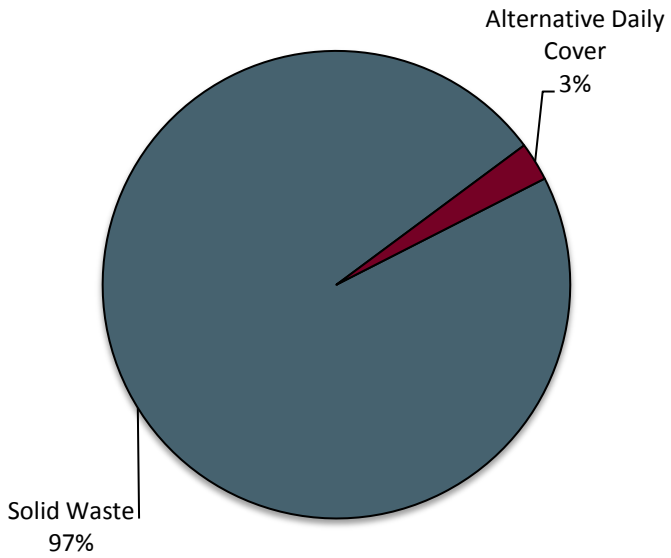


Solid Waste

Solid waste disposed of at managed landfills was responsible for 11% of total emissions for the community (see **Table A-2**). Waste emissions are considered Scope 3 emissions because they are not generated in the base year but will result from the decomposition of waste generated in 2007 over the full 100-year cycle of its decomposition. Waste and alternative daily cover (ADC) tonnages were provided by the Sonoma County Waste Management Authority (SCWMA) on December 13, 2010. Waste tonnages include waste sent to landfills from Santa Rosa. ADC is the temporary cover material placed on top of landfilled waste at the end of each day to control occurrences such as odors and scavenging. The ADC is landfilled along with other waste, and some types of ADC, including green waste and sludge, release GHG emissions. **Figure A-4** shows that only 3% of total emissions from solid waste result from ADC.

Landfill emissions are estimated using the California Air Resources Board Landfill Emissions Tool, version 1.2. The Landfill Emissions Tool uses the Intergovernmental Panel on Climate Change (IPCC) first-order decay model to calculate methane emissions. The tool defaults to an anaerobically degradable organic carbon (ANDOC) value of 8% based on California statewide waste composition in 2005. The analysis relied on the California statewide waste composition since localized data was not available. CO_2 emissions are not included in this analysis due to their biogenic origin.

FIGURE A-4: WASTE GHG EMISSIONS BY TYPE (REPRESENTS 10% OF COMMUNITY-WIDE GHG EMISSIONS)



Off-Road

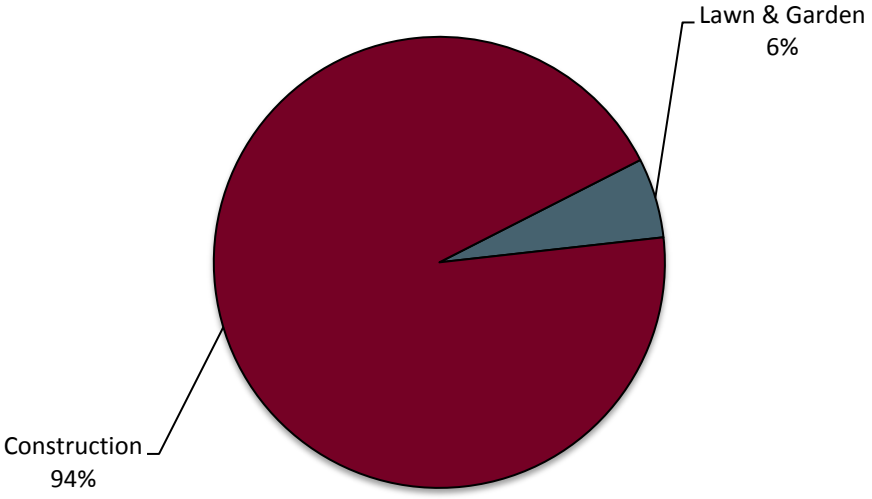
Off-road vehicles and equipment related to construction and lawn and garden activities accounted for 1% of emissions in 2007 (see **Table A-2**). While several other off-road equipment uses contribute to emissions in Sonoma County, currently there is no practical methodology to attribute countywide marine, recreational, airport, or other equipment and vehicles to each individual jurisdiction within the county. CARB's OFFROAD 2007 program provides construction and lawn and garden activity per county in the state. As shown in **Figure A-5,** GHG emissions from construction and lawn and garden activity make up 94% and 6% of off-road emissions, respectively. Per BAAQMD guidance, county-level activity and emissions for off-road equipment were attributed to the city using the following indicators:

- Total county construction equipment emissions were attributed to Santa Rosa using the proportion of new housing units built within the city compared to the entire county using the U.S. Department of Housing and Urban Development's (HUD's) State of the Cities Data Systems building permit reporting system.

- Total county lawn and garden emissions were attributed to the city using the proportion of existing households within Santa Rosa compared to the entire county using California Department of Finance (DOF) figures for 2007.

Please note that agricultural off-road equipment and vehicles are included in the agricultural sector of this inventory. Emissions from off-road equipment and vehicles were determined using CARB's OFFROAD 2007 program. OFFROAD provides the fuel consumption and emissions output for each type of off-road equipment in California per county, equipment type, fuel type, and year.

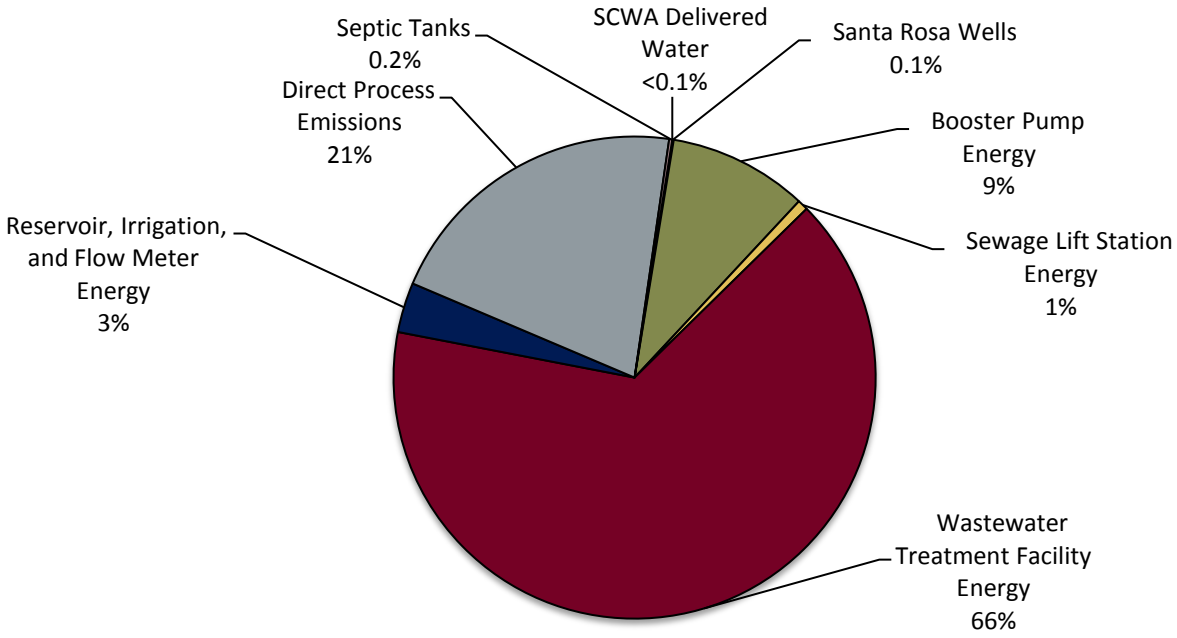
FIGURE A-5: OFF-ROAD GHG EMISSIONS BY EQUIPMENT CATEGORY (REPRESENTS 1% OF COMMUNITY-WIDE GHG EMISSIONS)



Water and Wastewater

Water and wastewater emissions accounted for 1% of total GHG emissions in 2007 (see **Table A-2**). This inventory includes three types of water and wastewater-related emissions: (1) direct process emissions[16] from the City's wastewater treatment facilities, (2) direct fugitive emissions from septic tanks in the city, and (3) emissions from the electricity and natural gas used to process, treat, and move water and wastewater to and from Santa Rosa. GHG emissions by type of activity are summarized in **Figure A-6.** Activity data for direct process emissions was obtained from the City of Santa Rosa Utilities Department.

FIGURE A-6: WATER AND WASTEWATER GHG EMISSIONS BY WATER ACTIVITY (REPRESENTS 0.7% OF TOTAL COMMUNITY-WIDE GHG EMISSIONS)



Water-related energy comes from three sources in Santa Rosa.

- **SCWA-delivered water –** The energy related to Sonoma County Water Agency (SCWA) water is consumed outside of the jurisdiction but is created by the Santa Rosa community's consumption. Information related to SCWA-delivered water is provided in the Department of Water Resources (DWR) Public Water System Statistics report for 2007. The electricity per gallon of delivered water coefficient is provided in the 2007 report, Greenhouse Gas Emissions, Energy Use and Emissions Reduction Potential, prepared by the SCWA and the Climate Protection Campaign.

[16] According to the Local Government Operations Protocol, "Process emissions from physical or chemical processing, other than fuel combustion (e.g., from the manufacturing of cement, aluminum, adipic acid, ammonia, etc.)."

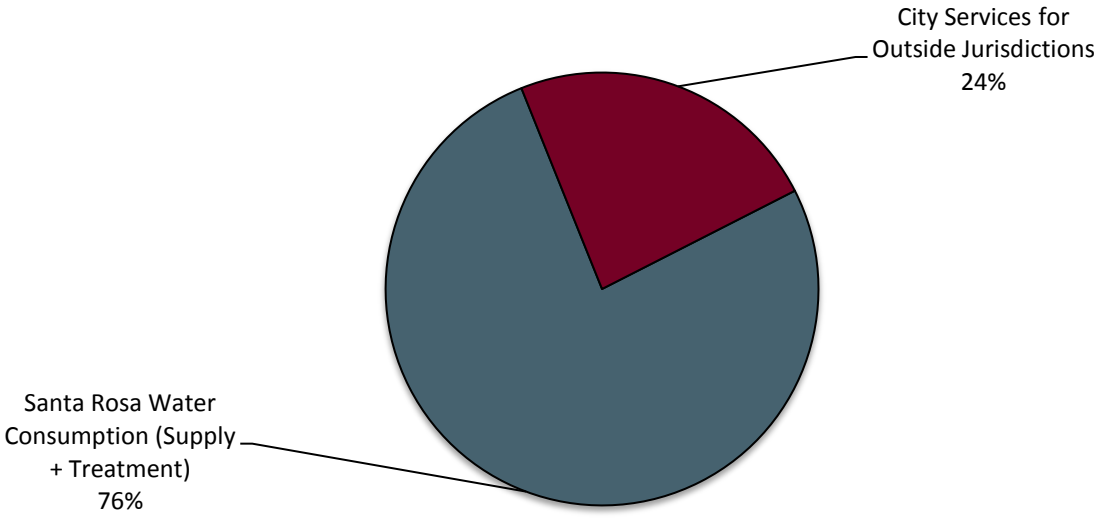
- **City well water –** This energy is consumed by City-owned wells that supplement SCWA water. Data related to well water is provided in the Department of Water Resources (DWR) Public Water System Statistics report for 2007. Energy consumption for well facilities was provided by PG&E in January 2011.

- **City-owned water facilities, including the Laguna Wastewater Treatment Facility, lift stations, pumps, and irrigation –** Energy consumption for these facilities was provided by PG&E in January 2011. The City's wastewater treatment plant is also powered from a cogeneration facility. This energy is not included in the inventory because biomass energy is considered a renewable source. After initial construction or installation, renewable energy sources do not contribute GHG emissions; they prevent the consumption of GHG-producing energy and fuels.

Wastewater treatment activities include moving the waste to the plant, treating the waste, and pumping treated water to the Geysers project or another location. The City's wastewater treatment plants serve the Santa Rosa community and outside communities such as Rohnert Park, Sebastopol, Cotati, and the Southpark Sanitation District. The proportion of wastewater treatment activity for the Santa Rosa community as opposed to outside communities was determined based on the amount of influent from each jurisdiction according to the June 2008 report, Greenhouse Gas Emissions Related to Water and Wastewater Services, prepared by the Climate Protection Campaign. Roughly 24% of Santa Rosa's water-related emissions are related to treatment of wastewater from outside jurisdictions such as Rohnert Park, Cotati, Sebastopol, and the Southpark Sanitation District, while 76% of water-related emissions are the direct result of Santa Rosa's water consumption and wastewater treatment (**Figure A-7**).

Direct process emissions are calculated using formulae found in Chapter 10 of the Local Government Operations Protocol version 1.1. Water-related energy is converted to GHG emissions using the default PG&E coefficients provided in the energy sector of this inventory.

FIGURE A-7: WATER CONSUMPTION BY JURISDICTION



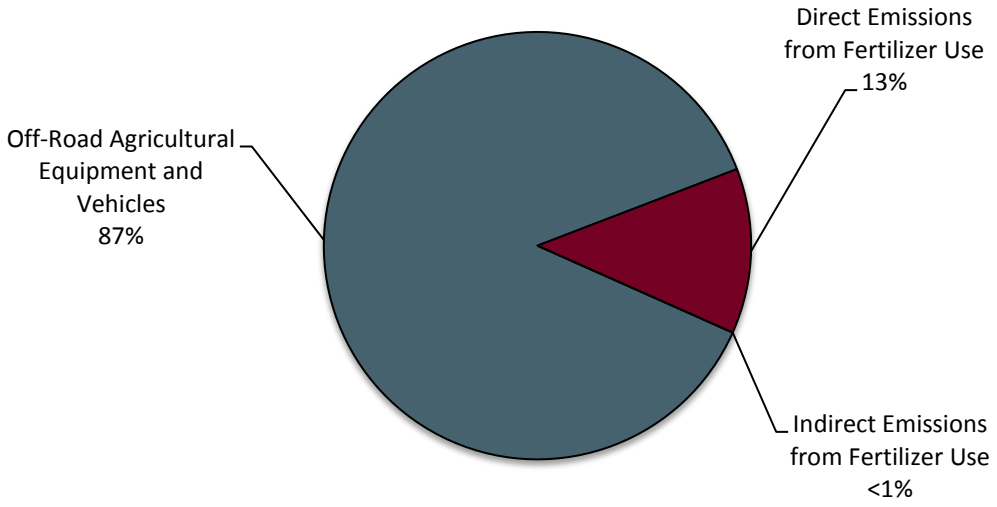
Agriculture

Agricultural processes account for <1% of the 2007 inventory (see **Table A-2**). Two types of agricultural emissions sources are analyzed in this report: (1) emissions from agricultural equipment and vehicles such as tractors, and (2) emissions from crop management, specifically application of fertilizer. A summary of agriculture GHG emissions is presented in **Figure A-8.**

Total county agricultural emissions from equipment and vehicles were attributed to the city using the proportion of agricultural land in Santa Rosa compared to the entire county. Crop data was provided by the Sonoma County Agricultural Commissioner's office.

An average nitrogen fertilizer use for each crop was identified using University of California Cooperative Extension cost reports and information from the local Farm Advisor's office. A weighted average of nitrogen fertilizer was calculated for each crop category (grapes, hay, walnuts, and vegetables) and assumed to apply to all other cropland not within the top three crops for each category. An equation provided by the California Air Resources Board was used to calculate grams of N_2O per pound of nitrogen fertilizer applied per acre. Grams of N_2O were converted into metric tons of CO_2e using factors provided in the Local Government Operations Protocol Version 1.0.

FIGURE A-8: AGRICULTURE GHG EMISSIONS BY ACTIVITY (REPRESENTS <1% OF COMMUNITY-WIDE GHG EMISSIONS)



Transportation

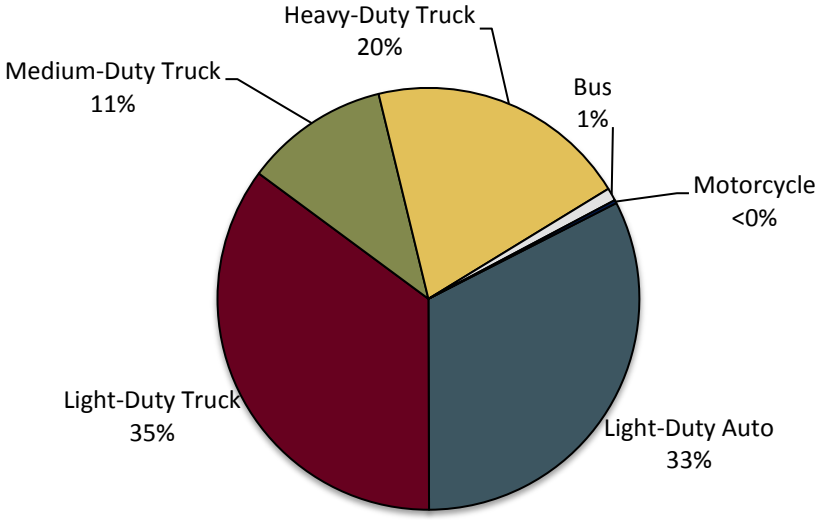
Transportation emissions accounted for 51% of the 2007 inventory (see **Table A-2**). As with the majority of California municipalities, travel by on-road motorized vehicles constitutes the greatest percentage of GHG emissions in the city. Using origin-destination analysis, three types of vehicle trips were tracked separately for AM and PM peak periods in Santa Rosa:

- Internal-Internal: Vehicle trips that remained inside Santa Rosa
- Internal-External and External-Internal: Vehicle trips that have an ending or a beginning in Santa Rosa and another outside of Santa Rosa
- External-External: Vehicle trips that pass through Santa Rosa

Using the recommendation of the Regional Target Advisory Committee (RTAC), the body responsible for Senate Bill 375 target setting, vehicle miles traveled (VMT) from trips of type 1, 2, and 3 were counted 100%, 50%, and 0% respectively toward jurisdiction-generated VMT.

Transportation-related greenhouse gas emissions were calculated using the CARB Emissions Factor 2007 (EMFAC2007) software. The GHG emissions per vehicle type are shown in **Figure A-9**. Light-duty autos such as compact cars and light-duty trucks such as SUVs and pickup trucks contribute 33% and 35% of transportation-related emissions, respectively. The remaining 33% of emissions are the result of commercial vehicles, motorcycles, and buses. EMFAC2007 provides carbon dioxide emissions according to the unique vehicle composition of each county in California, including Sonoma County, which was used for this report. Individual GHGs such as carbon dioxide, methane, and nitrous oxide are converted to CO_2e by multiplying the CO_2 emissions by a conversion factor provided by the U.S. Environmental Protection Agency of 100/95.

FIGURE A-9: TRANSPORTATION-RELATED GHG EMISSIONS BY VEHICLE TYPE (REPRESENTS 51% OF COMMUNITY-WIDE GHG EMISSIONS)



MUNICIPAL OPERATIONS INVENTORY

A city government operations inventory includes all emissions sources owned, operated, and/or under the influence of a city government such as fleet vehicles, water and wastewater facilities, buildings, and employee commute. Government emissions are a small part of the overall community-wide emissions in the non-residential energy, transportation, water, and waste emissions categories.

An inventory of City government operations was completed as part of the City of Santa Rosa Greenhouse Gas Reduction Action Plan Analysis prepared under the direction of the Climate Protection Campaign and funded by the California Public Utilities Commission. The analysis studies the baseline year of 2000. Since the baseline year for City government operations is different from the 2007 baseline for community-wide emissions, the two cannot be directly compared or overlapped. To address this discrepancy, and to create a common baseline against which municipal and community-wide emissions can be measured and the City's progress in attaining reduction goals can be tracked, a baseline municipal inventory was prepared for a baseline year of 2007.

The 2007 baseline municipal GHG inventory includes GHG emissions from the operations and activities conducted by the City of Santa Rosa. GHG emissions were calculated based on data collected by the City and consistent with best practices and methodologies recommended by the California Air Resources Board through the Local Government Operations Protocol, version 1.1 (LGOP, v 1.1).

The Inventory analyzes the following activities and emissions sources:

- Buildings and Facilities[17]
- Equipment
- Fleet
- Public Lighting
- Water Operations
- Employee Commute
- Waste Disposal
- Wastewater Operations

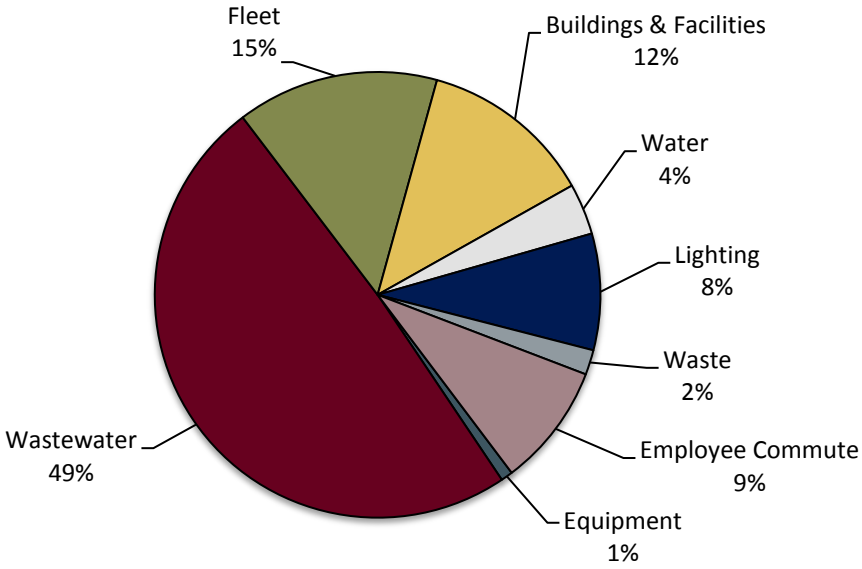
This analysis determined that in 2007, operations and activities by the City of Santa Rosa resulted in approximately 27,820 metric tons of carbon dioxide equivalents ($MTCO_2e$). **Table A-3** and **Figure A-10** depict the contribution of each activity to the total GHG emissions from municipal operations in 2007. Wastewater operations and the City's fleet make up the majority of the city's emissions, with wastewater producing 13,600 $MTCO_2e$ and the fleet resulting in 8,510 $MTCO_2e$. Buildings and facilities make up 12% of total municipal emissions, which are followed closely by employee commute and public lighting, contributing 9% and 8%, respectively. The remaining sectors, water operations, waste, and equipment, make up the remaining 7% of total GHG emissions.

[17] Refrigerants from facility HVAC equipment were not analyzed as part of this assessment as directed by the Local Government Operations Protocol. R-22, the refrigerant used at City facilities is a GHG that is being phased out of use under the Kyoto Protocol and therefore is not recommended for inclusion in the City's baseline inventory.

TABLE A-3: 2007 SANTA ROSA MUNICIPAL BASELINE GREENHOUSE GAS EMISSIONS

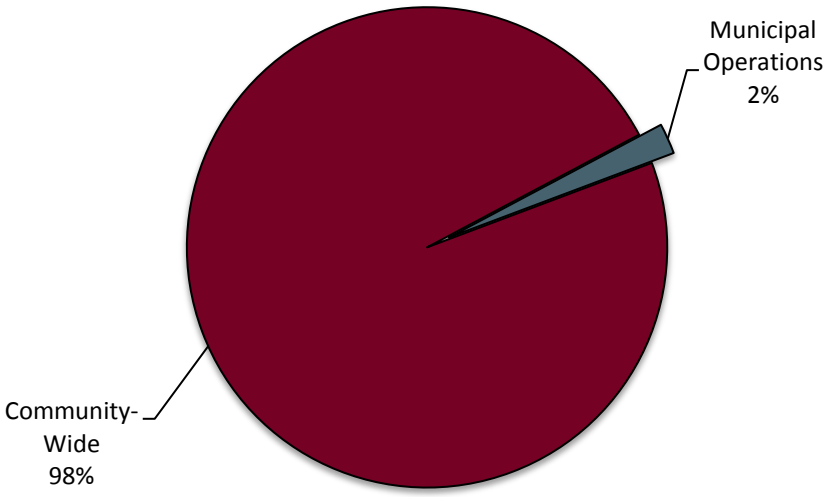
Sector	Activity Type	Activity Data	$MTCO_2e$	Total $MTCO_2e$
Buildings & Facilities	Electricity	7,443,900	2,160	3,480
	Natural Gas	248,100	1,320	
Equipment	CNG	330	0	340
	Diesel	14,070	140	
	Electric	30	0	
	Gasoline	21,360	190	
	Propane	620	0	
Fleet	CNG	10,450	60	4,060
	Diesel	283,980	2,900	
	Electric	0	0	
	Gasoline	121,510	1,080	
	Propane	3,170	20	
Public Lighting	Streetlights	6,823,000	1,980	2,340
	Traffic Lights	757,300	220	
	Other Lighting	479,100	140	
Water Operations	Irrigation Controls	88,050	30	1,030
	Water Operations	3,448,740	1,000	
Employee Commute	Annual Employee VMT	5,557,600	2,470	2,470
Waste	Tons Disposed	720	500	500
Wastewater Operations	Direct Process Emissions	2,050	2,050	13,600
	Electricity	23,990,200	6,910	
	Natural Gas	871,900	4,640	
			TOTAL	**27,820**

FIGURE A-10: 2007 SANTA ROSA MUNICIPAL GREENHOUSE GAS EMISSIONS



Municipal GHG emissions are considered a sub-set of community-wide GHG emissions since the majority of municipal activities occur within the boundaries of the City of Santa Rosa. When compared, municipal emissions account for approximately 2% of community-wide emissions, as shown in **Figure A-11.**

FIGURE A-11: MUNICIPAL OPERATIONS AS A PORTION OF COMMUNITY-WIDE GHG EMISSIONS



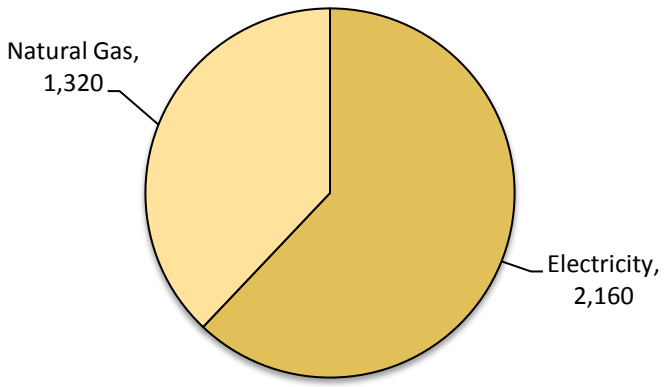
MUNICIPAL OPERATIONS ACTIVITY DETAIL

Buildings & Facilities

Approximately 12% of total municipal emissions in 2007 came from City operated buildings and facilities. GHG emissions from buildings are a result of the electricity and natural gas used to heat, light, and operate buildings and facilities. In 2007, Santa Rosa City facilities used approximately 7.44 million kilowatt hours (kWh) of electricity, and 248,100 Therms of natural gas, resulting in a total 3,480 $MTCO_2e$, as shown in **Figure A-12**.

Pacific Gas & Electric provided a 2007 carbon dioxide (CO_2) coefficient for electricity and the CO_2 coefficient for natural gas. Emissions coefficients for methane (CH_4) and nitrous oxide (N_2O) emissions were provided by the California Air Resources Board's (CARB) Local Government Operations Protocol (LGOP) v1.1 and were converted into carbon dioxide equivalents and added to the CO_2 coefficient to create a CO_2e coefficient.

FIGURE A-12: BUILDINGS AND FACILITIES GHG EMISSIONS BY FUEL TYPE (REPRESENTS APPROXIMATELY 12% OF MUNICIPAL EMISSIONS)

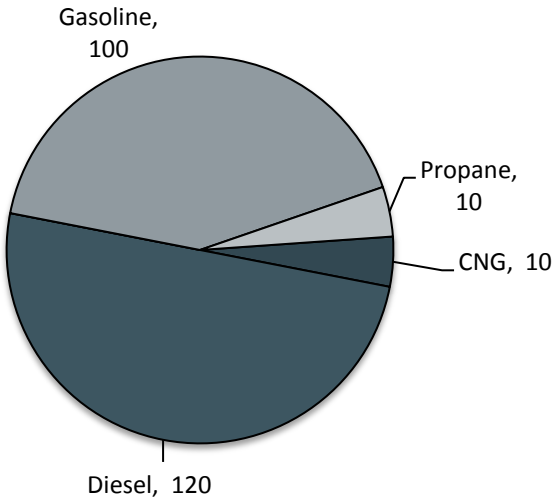


Equipment

City-owned equipment accounted for approximately 1% of municipal emissions in 2007. GHG emissions from equipment are a result of CNG, diesel, gasoline, propane, and electric fuel consumption from the City's equipment. Equipment used by the City includes generators, tractors, lawn mowers, forklifts, and loaders. **Figure A-13** shows the GHG emissions for equipment by fuel.

Fuel use data for all equipment not used on roads such as construction and lawn and gardening equipment were provided by City of Santa Rosa's fleet manager. Emissions coefficients for carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) emissions were provided for each fuel type by the California Air Resources Board's (CARB) Local Government Operations Protocol (LGOP) v1.1 and were multiplied by their respective global warming potential to create a CO_2e coefficient.

FIGURE A-13: EQUIPMENT GHG EMISSIONS BY FUEL TYPE (REPRESENTS APPROXIMATELY 1% OF MUNICIPAL EMISSIONS)

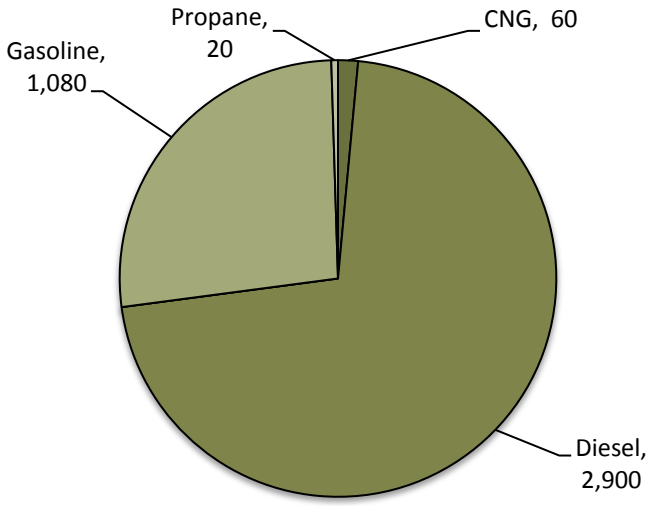


Fleet

In 2007 the municipal fleet emitted 4,060 $MTCO_2e$ and accounted for 15% of total municipal emissions. City-owned vehicles include sedans, light, medium, and heavy-duty trucks, transit vehicles, police vehicles, fire apparatus, street sweepers, and garbage trucks, among other vehicles. These fleet vehicles utilize a variety of fuels including compressed natural gas, diesel, electricity, gasoline, and propane. **Figure A-14** shows the breakdown of fleet-related GHG emissions by fuel.

Fuel use data and mileage for all municipally owned vehicles were provided by the City of Santa Rosa's fleet manager. Emissions coefficients for carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) emissions were provided for each fuel type by the California Air Resources Board's (CARB) Local Government Operations Protocol (LGOP) v1.1 and were multiplied by their respective global warming potential to create a CO_2e coefficient. CO_2 emissions correlate with the amount of fuel used while CH_4 and N_2O emissions depend on the amount the vehicle is driven.

FIGURE A-14: FLEET GHG EMISSIONS BY FUEL TYPE (REPRESENTS APPROXIMATELY 31% OF MUNICIPAL EMISSIONS)

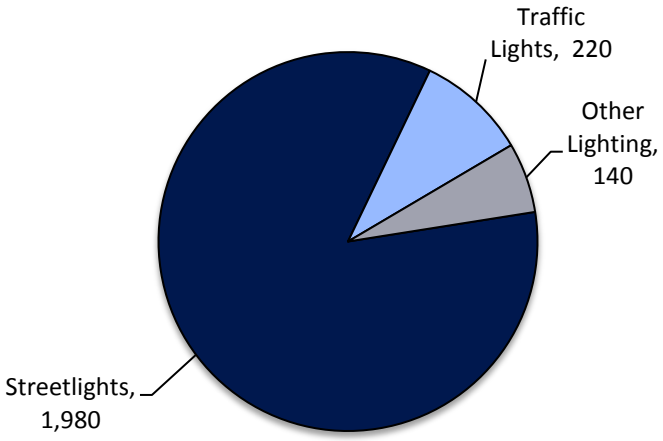


Public Lighting

Electricity used by public lighting within Santa Rosa accounted for 8% of total emissions in 2007, or 2,340 $MTCO_2e$. Public lighting includes street lighting, traffic signals, and other lighting at parks, decorative lighting, and safety lighting. As shown in **Figure A-15,** the majority of lighting related emissions and energy use are associated with streetlights.

Pacific Gas & Electric Company provided a 2007 carbon dioxide (CO_2) coefficient for electricity. Emissions coefficients for methane (CH_4) and nitrous oxide (N_2O) emissions were provided by the California Air Resources Board's (CARB) Local Government Operations Protocol (LGOP) v1.1, were converted into CO_2e and added to the CO_2 coefficient to create a CO_2e coefficient.

FIGURE A-15: LIGHTING GHG EMISSIONS BY LIGHTING ACTIVITY (REPRESENTS APPROXIMATELY 8% OF MUNICIPAL EMISSIONS)

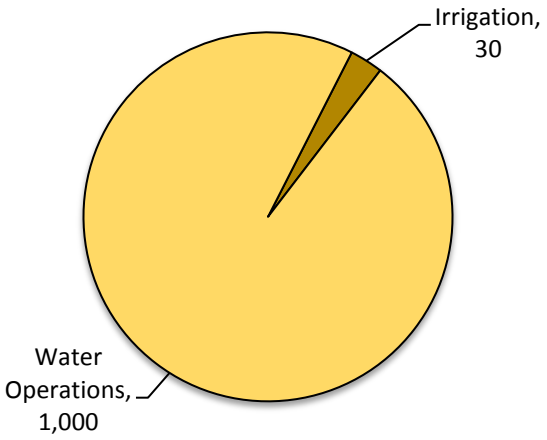


Water

Emissions from the energy used to pump, treat, and deliver water within the city accounted for 4% of total emissions in 2007. This sector includes the energy used for irrigation controls, in addition to the energy used by city-owned and operated pumps, reservoirs, wells, and facilities to treat and deliver water to the community. **Figure A-16** demonstrates the contribution of each activity's contribution to water related GHG emissions.

Pacific Gas & Electric Company provided a 2007 carbon dioxide (CO_2) coefficient for electricity and natural gas. Emissions coefficients for methane (CH_4) and nitrous oxide (N_2O) emissions were provided by the California Air Resources Board's (CARB) Local Government Operations Protocol (LGOP) v1.1 and were converted into carbon dioxide equivalents and added to the CO_2 coefficient to create a CO_2e coefficient.

FIGURE A-16: WATER OPERATIONS GHG EMISSIONS BY ACTIVITY (REPRESENTS APPROXIMATELY 4% OF MUNICIPAL EMISSIONS)



Employee Commute

Emissions from the commute of Santa Rosa's employees totaled 2,470 $MTCO_2e$ and accounted for 9% of total municipal emissions. In 2007, employees traveled an estimated 5,557,600 miles for commuting purposes. To estimate commute trip length and vehicle, the following assumptions were made based on a 2008 commute survey completed by City staff.

The 2008 commute survey included 172 responses. The 172 responses were converted into vehicle miles traveled based on the origins listed in the commute survey, and the number of employees in each city department. To determine total employee commute distances for all employees, an average of all calculated responses was taken and multiplied by FTE employee numbers for FY 07/08. Secondary modes of transportation were assumed to be used an average of once every two weeks and incorporated into the total employee commute distances as well. Emissions factors are weighted averages of passenger vehicles in Sonoma County's BAAQMD territory derived from the California Air Resources Board's EMFAC 2011 Software for the calendar year 2007.

Waste

Solid waste collected at City facilities accounted for 2% of total emissions in 2007. Emissions from waste disposal occur as the organic materials decompose over the next 100 years into methane when buried in a landfill. Waste tonnages were provided by the City of Santa Rosa staff. Seven hundred twenty (720) tons of waste was collected at city facilities and disposed in 2007.

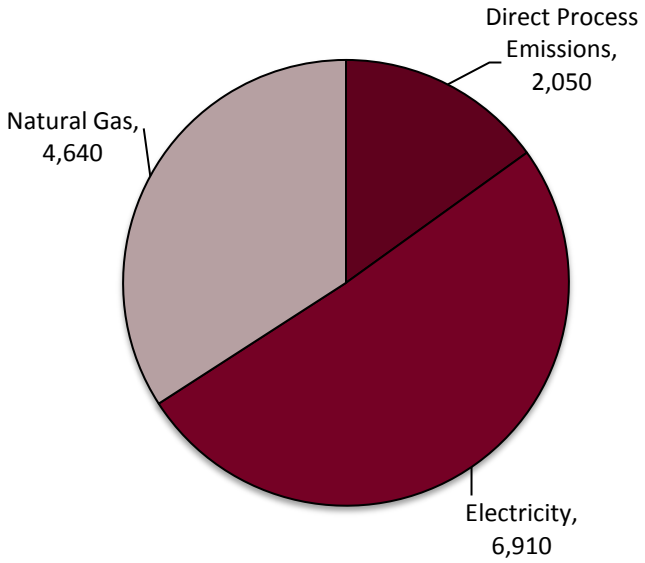
Landfill emissions are estimated using the California Air Resources Board Landfill Emissions Tool. v1.2. The Landfill Emissions Tool uses the Intergovernmental Panel on Climate Change (IPCC) first-order decay model to calculate methane emissions. The tool estimates an anaerobically degradable organic carbon (ANDOC) value of 6.72% based on California statewide waste composition in 2007. The analysis relies on the California statewide waste composition estimates.

Wastewater

Emissions occurring due to the pumping, treatment, and disposal of wastewater within the city accounted for 49% of total emissions in 2007. This sector includes both direct and indirect sources of GHG emissions. Direct wastewater emissions occur at the plant as a result of the wastewater treatment process. Indirect emissions are a result of the electricity and natural gas used on- and off-site to move and treat the wastewater. **Figure A-17** demonstrates the contribution of each activity's contribution to wastewater-related GHG emissions.

Direct wastewater emissions are estimated using equations provided in Chapter 10 of the Local Government Operations Protocol. City of Santa Rosa Staff provided the inputs, such as methane digester gas, to calculate the direct emissions associated with the wastewater treatment process. Pacific Gas & Electric Company provided a 2007 carbon dioxide (CO_2) coefficient for electricity and natural gas. Emissions coefficients for methane (CH_4) and nitrous oxide (N_2O) emissions were provided by the California Air Resources Board's (CARB) Local Government Operations Protocol (LGOP) v1.1 and were converted into carbon dioxide equivalents and added to the CO_2 coefficient to create a CO_2e coefficient.

FIGURE A-17: WASTEWATER OPERATIONS GHG EMISSIONS BY ACTIVITY (REPRESENTS APPROXIMATELY 49% OF MUNICIPAL EMISSIONS)



2015, 2020, AND 2035 GHG FORECAST

A GHG emissions forecast is a prediction of how GHG emissions will change in the future with anticipated changes in population, commercial activity, and driving patterns. The GHG emissions forecast of community-wide emissions focuses on three target years: 2015, 2020, and 2035. The 2015 year is analyzed to determine whether the City will meet its adopted community-wide GHG reduction target of 25% below 1990 levels by 2015. The 2020 year is estimated for consistency

with Assembly Bill 32 targets and BAAQMD guidelines. Finally, the year 2035 is studied to create a parallel with the 2035 General Plan.

Business-As-Usual Emissions

A business-as-usual projection is an estimate of how emissions would grow if consumption trends and efficiencies remain at their 2007 levels yet the number of people, households, and jobs continue to grow in Santa Rosa. In other words, it is the status quo scenario before state, regional, and local reduction efforts are taken into consideration. The business-as-usual projection utilizes the demographic projections from the 2035 General Plan for commercial square footage, residential units, and population at buildout. General Plan buildout is the growth scenario under which land is developed to the maximum potential or theoretical capacity permitted by the proposed General Plan and its land use designations.

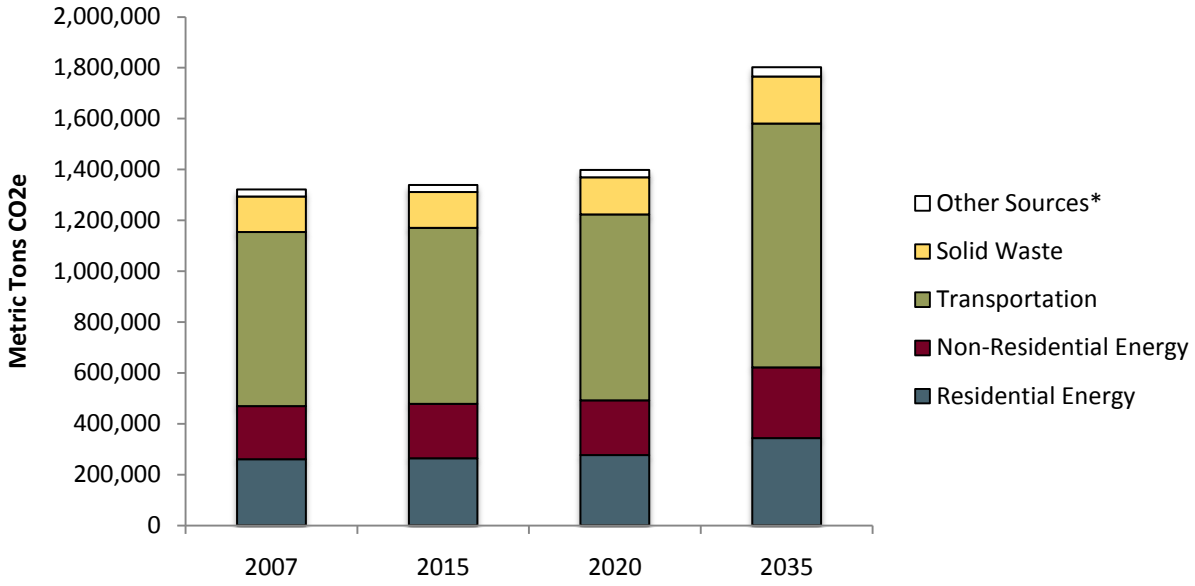
The General Plan buildout scenario analyzes growth in the City's Urban Growth Boundary by 2035. City staff provided interim-year growth projections for 2015 and 2020 based on recent trends and anticipated short-term growth in residential and commercial building permits and the City's Pending Development Report. Between 2007 and 2015, moderate residential and non-residential permitting is assumed. Between 2015 and 2020, increasing growth in both categories is assumed. Given the current economic downturn and its effect on development, the City anticipates that the majority of Santa Rosa's General Plan buildout growth would occur between 2020 and 2035. As shown in **Table A- 4** and **Figure A-18**, emissions are anticipated to grow 1% from 2007 to 2015, 6% from 2007 to 2020, and 37% from 2007 to 2035.

TABLE A-4: 2015, 2020, AND 2035 BUSINESS-AS-USUAL GHG FORECAST

Sector	2007 $MTCO_2e/Yr$	2015 $MTCO_2e/Yr$	2020 $MTCO_2e/Yr$	2035 $MTCO_2e/Yr$
Residential Energy	259,640	264,360	276,420	346,470
Non-Residential Energy	209,880	213,550	215,600	277,810
Solid Waste	139,770	141,340	146,860	185,340
Transportation	684,280	691,190	728,820	959,470
Water and Wastewater	9,840	9,950	10,340	13,040
Off-Road	17,670	17,990	18,810	23,580
Agriculture	170	120	90	0
TOTAL	**1,321,250**	**1,338,500**	**1,396,940**	**1,805,710**
Percentage Change from 2007	0%	1%	6%	37%

** Due to rounding, the total may not be the sum of component parts.*

FIGURE A-18: BUSINESS-AS-USUAL GHG FORECAST



** Other Sources include water and wastewater, agriculture, and off-road emissions representing less than 2% of the Inventory.*

Emissions related to energy, water, wastewater, waste, and off-road equipment are anticipated to grow linearly with General Plan residential, commercial, and population growth. Agricultural activity is anticipated to be displaced beyond the Urban Growth Boundary area as a result of future development. On-road vehicle miles traveled (VMT) in 2035 were modeled by Fehr & Peers transportation consultants using the 2035 Sonoma County Transportation Authority (SCTA) Travel Demand Model assuming no intervening VMT reduction measures. Fehr & Peers estimated 2015 and 2020 VMT forecasts by linearly interpolating between the 2007 base year results and the 2035 General Plan results using the interim-year projections modeled by City staff. VMT estimates were converted to GHG using the California Air Resources Board EMFAC2007 software.

Impact of State Reduction Efforts to Business-As-Usual Emissions

The State of California has been proactive in reducing GHG emissions. Several regulations and efforts at the state level will lessen Santa Rosa's future GHG emissions, including vehicle standards, building standards, and the renewable energy content of electricity. The state actions summarized below are incorporated into the business-as-usual forecast to create a more realistic estimate of the city's future emissions. This adjusted forecast is detailed in **Table A-5** and includes the following State Programs:

- Renewable Portfolio Standard
- Clean Car Fuel Standard (Pavley)
- CALGreen Building Standard

TABLE A-5: SUMMARY OF GHG FORECAST ADJUSTED FOR STATE ACTIONS ($MTCO_2e$)

	2007	2015	2020	2035
Business-As-Usual Emissions	1,321,250	1,338,500	1,396,940	1,805,710
Renewable Portfolio Standard (RPS)	–	-26,700	-43,640	-95,680
AB 1493 (Pavley) Vehicle Standards	–	-49,780	-101,820	-220,760
CALGreen Building Standards	–	-7,920	-16,290	-70,600
Subtotal State Reduction Efforts*	–	-84,400	-161,760	-387,040
Net Emissions*	1,321,250	1,254,100	1,235,170	1,418,670
Percentage Change from 2007 Levels	0%	-5%	-6%	7%

** Due to rounding, the total may not be the sum of component parts.*

As shown in **Table A-5**, state reduction efforts are anticipated to reduce business-as-usual emissions by 84,400 $MTCO_2e$ in 2015, 161,760 $MTCO_2e$ in 2020, and 387,040 $MTCO_2e$ in 2035. The majority of these reductions are from the AB 1493 (Pavley) standards and PG&E's renewable energy portfolio. In comparison to the business-as-usual scenario, 2020 emissions with state reduction measures are 6% below baseline 2007 levels rather than 6% above 2007 levels. Similarly, 2035 emissions go from 36% above baseline 2007 levels in the business-as-usual scenario to only 7% above baseline levels after state efforts are taken into account.

SANTA ROSA'S EXISTING GHG REDUCTION EFFORTS

The City has made significant efforts to implement policies and programs to reduce GHG emissions, increase renewable energy use, and minimize energy-related costs for both the City and the community. This section highlights the GHG reduction benefit of programs and policies undertaken since the baseline year of 2007. In other words, this section outlines the City's progress to date toward achieving GHG reduction targets. **Table A-6** provides a summary of the GHG reductions that have or will occur from in-process or completed programs since 2007. Full implementation of the City's existing programs detailed below is estimated to have reduced 26,530 $MTCO_2e$ in 2010. More importantly, the City's efforts will continue to reduce emissions through 2035.

Renewable energy installations in the city have reduced GHG emissions by approximately 6,020 $MTCO_2e$. This reduction includes the City's installation of solar photovoltaic systems at the Laguna Wastewater Treatment Plant, Brown Farm, West College, and the Bennett Valley Golf Course. It also includes an additional 15 MW of energy generated per day through the City's Geysers project. Lastly, this estimate also includes renewable energy installations by the community, as incentivized through the Sonoma County Energy Independence Program (SCEIP), California Solar Initiative, and Clean Energy Advocate Program. Also notable is the City's green building ordinance and water-

efficient landscaping ordinance. These ordinances will reduce GHG emissions while saving the community electricity, natural gas, and nearly 59 million gallons of water by 2020.

Through collaboration with the Sonoma County Waste Management Authority, the community has also reduced the amount of waste sent to landfills by nearly 20,000 tons annually since 2007, resulting in a GHG reduction of approximately 19,180 $MTCO_2e$ in 2010. Continued waste reduction efforts will decrease waste-related GHG emissions as Santa Rosa continues to grow.

The City's existing efforts related to transportation and VMT reduction, including increasing bicycle and pedestrian connections though implementation of the City's Bicycle and Pedestrian Master Plan and station area plans, are not included in this analysis of existing efforts. Transportation measures require transportation model manipulation and must be quantified concurrently with Climate Action Plan goals and policies by a transportation engineer.

TABLE A-6: SUMMARY OF CITY GHG REDUCTION EFFORTS

GHG Reduction Effort	GHG Reductions ($MTCO_2e$/year)			
	2010	**2015**	**2020**	**2035**
BAU with State Actions	1,310,020	1,254,100	1,235,170	1,418,670
Photovoltaic Installations	-80	-160	-150	-130
Aquatic Biomass Project	<1	<1	<1	<1
Clean Energy Advocate Program + California Solar Initiative	-4,440	-4,240	-3,940	-3,350
Regional Building Retrofit Program	-210	-200	-190	-170
Waste Minimization	-19,170	-19,180	-19,170	-23,660
EECBG Grant Projects	-1,430	-1,330	-1,300	-1,130
Lighting Technologies	–	-40	-40	-30
Community Green Building Ordinance	–	-890	-1,020	-8,760
Water-Efficient Materials and Equipment	-490	-490	-490	-490
Water-Efficient Landscape Ordinance	<1	<1	<1	<1
Total	**-25,730**	**-26,530**	**-26,300**	**-38,120**
Net Emissions	1,284,290	1,227,570	1,208,870	1,381,550
Percentage Change from 2007 Baseline	-2%	-7%	-9%	5%

The totals in **Table A-6** represent a scenario in which no further action is taken to reduce GHG emissions; rather, the table shows how the efforts undertaken from 2007 to 2011 will continue to reduce greenhouse gases through 2015, 2020, and 2035. Due to state reduction efforts, the GHG reduction potential of certain measures will decrease or vary in future years. For instance, the Renewable Portfolio Standard (RPS) will decrease the GHG impact of one kWh of electricity. This causes existing solar installations to have less of a GHG reduction impact over time.

SANTA ROSA'S GHG REDUCTION TARGETS

The next step is for the City to determine GHG reduction targets for 2020 and 2035. The BAAQMD CEQA Guidelines require local governments to establish a GHG reduction target for 2020 and for the target year of the document, which in Santa Rosa's case is 2035, consistent with General Plan buildout. The new GHG reduction targets will be the goal of the Climate Action Plan and a way of measuring the success of the GHG reduction program.

Locally Adopted GHG Reduction Targets

In August 2005, the City adopted two GHG reduction targets for 2010 and 2015 via Council Resolution Number 26341. The resolution set a greenhouse gas emissions reduction target for City government operations of 20% from 2000 levels by 2010.

Resolution 26341 also set a community-wide greenhouse gas emission reduction target of 25% from 1990 levels by 2015. According to the California Air Resources Board, 1990 emissions were approximately 15% lower than 2007 levels. A reduction target of 25% below 1990 levels would therefore be equivalent to a 37% reduction below 2007 baseline levels. According to the analysis of activities to date shown in **Table A-6**, the City's GHG emissions are estimated to be 2% below 2007 levels by 2015, or 35% short of the 2015 target. Given the short time until 2015, it is not anticipated that this goal will be met.

State-Recommended 2020 and 2035 Reduction Targets

The City's Climate Action Plan should, at minimum, meet the GHG reduction target adopted by the State via AB 32. AB 32 calls for statewide GHG emissions to return to 1990 levels by 2020. The AB 32 Scoping Plan identifies local governments as "essential partners" in achieving this target and identifies 15% below current (2005–2008) levels as the local government equivalent of 1990 GHG emission levels.

The State has not adopted GHG reduction targets for any year past 2020; however, in 2005, Governor Schwarzenegger signed Executive Order S-3-05, which created a goal to reduce GHG emissions to 1990 levels by 2020 and to 80% below 1990 levels by 2050. An 80% reduction below 1990 levels is equivalent to a 95% reduction below 2007 levels by 2050.

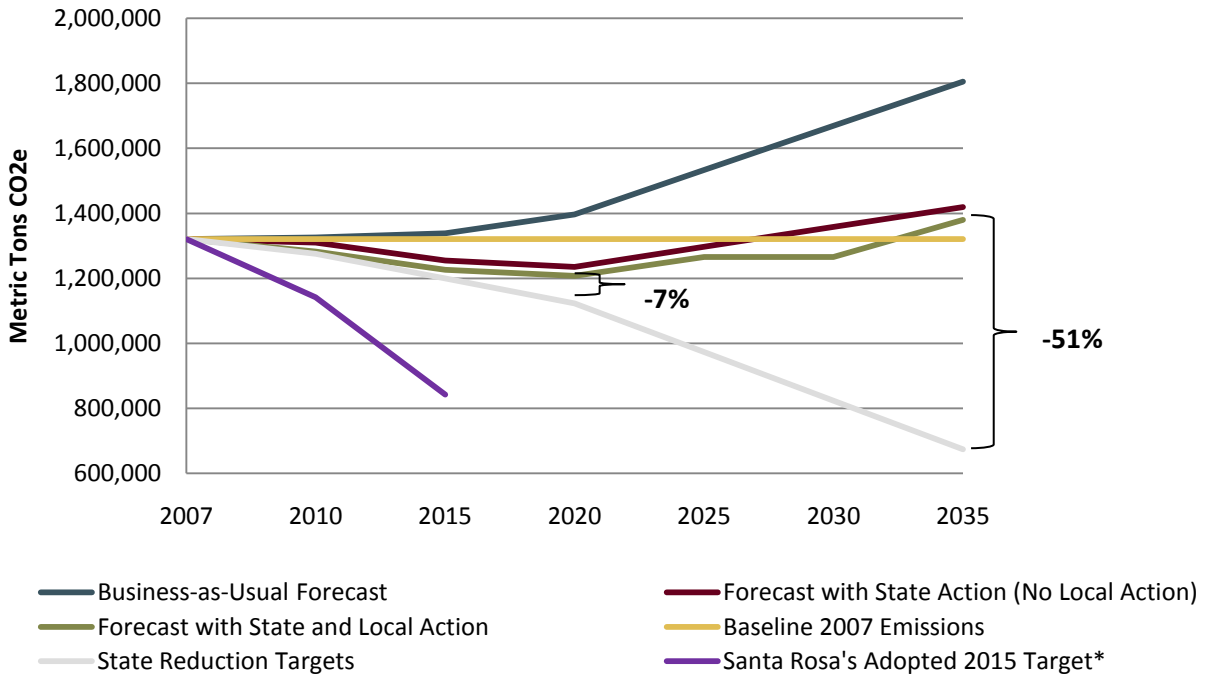
As shown in **Table A-7**, the City would need to facilitate a 7% reduction in emissions to meet the AB 32 Scoping Plan goal of 15% below 2007 levels by 2020. Similarly, to be on a trajectory toward the E.O. S-3-05 target for 2050, the City needs to reduce emissions 51% by 2035.

TABLE A-7: SANTA ROSA GHG EMISSIONS & STATE REDUCTION TARGETS

	2007	2010	2015	2020	2035
Santa Rosa GHG Forecast (Including Existing Actions)	1,321,240	1,284,290	1,227,570	1,208,870	1,381,550
State Reduction Targets	1,321,240	1,275,510	1,199,280	1,123,060	673,830
Local Reduction Necessary to Meet State Targets	0%	-1%	-2%	-7%	-51%
Local Reduction Necessary to Meet City Target	N/A	N/A	-25%	N/A	N/A

Figure A-19 shows the City's GHG reduction forecasts in relation to baseline and state reduction targets. The City's adopted 2015 goal is shown in purple.

FIGURE A-19: SANTA ROSA GHG FORECAST AND REDUCTION TARGETS



** Santa Rosa adopted a GHG reduction target of 25% below 1990 levels, or 37% below 2007 levels.*

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APPENDIX B –
GHG METHODOLOGY

City of Santa Rosa
Community Development

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APPENDIX B: GHG METHODOLOGY

1.1 CALGREEN REQUIREMENTS FOR NEW CONSTRUCTION

Continue to enforce and require new development to meet Tier 1 CALGreen requirements, as amended, for new non-residential and residential development.

Action Items:

- Action 1.1.1. Require new development to comply with the current provisions, as amended, of CALGreen, Part 11 of the California Green Building Standards Code.
- Action 1.1.2. Continue to require Tier 1 standards for new development and consider adding major remodels during the next building code update.
- Action 1.1.3. Require all new construction to be built with net zero electricity use, beginning in 2020.
- Action 1.1.4. Evaluate potential incentives for projects that have net zero electricity use, prior to 2020.

GHG Reduction:

2010: Calculation included in existing activities

2015: Calculation included in existing activities

2020: Calculation included in existing activities

2035: Calculation included in existing activities

Implementation Time Frame:	Ongoing
Implementing Department:	Community Development
Supporting Agencies:	N/A
Mandatory or Voluntary:	Mandatory
2010 Performance Targets:	N/A
2015 Performance Targets:	All new development and major remodels comply with Tier 1 CALGreen requirements
2020 Performance Targets:	All new development and major remodels comply with Tier 1 CALGreen requirements
2035 Performance Targets:	All new development and major remodels comply with Tier 1 CALGreen requirements

GHG Assumptions:

The City of Santa Rosa has already adopted, and will continue to enforce, the Tier 1 standards of CALGreen. The GHG reductions associated with this measure have already been included in the adjusted business-as-usual forecast.

GHG Sources:

California Air Pollution Control Officers Association. 2010. Quantifying Greenhouse Gas Mitigation Measures.

California Energy Commission. 2010. Nonresidential Building Energy Performance Rating Disclosure Regulations. Sacramento.

1.2 ENERGY EFFICIENCY IN EXISTING BUILDINGS

Facilitate energy efficiency upgrades and retrofits in existing commercial, residential, and industrial buildings by connecting residents and businesses with technical and financial assistance.

Action Items:

- Action 1.2.1. Connect businesses and residents with voluntary programs that provide free or low-cost energy efficiency audits and financing assistance for energy-efficient appliances.
- Action 1.2.2. Work with the Sonoma County Energy Independence Program (SCEIP) to offer low-interest financing and technical assistance to property owners for energy efficiency retrofits.
- Action 1.2.3. Create a renter's energy efficiency informational brochure or website.
- Action 1.2.4. Create a retrofit brochure or website specific to historic structures utilizing the EPA *Sustainable Solutions for Historic Houses in Northern California* guidelines to ensure sensitive retrofit of older buildings.
- Action 1.2.5. Seek funding to expand the retrofit of affordable housing units.
- Action 1.2.6. Utilize Hot Spot Maps (RCPA) to identify neighborhoods that may be prioritized for a retrofit pilot program.
- Action 1.2.7. Develop a City Energy project to reduce energy in all City facilities through lighting retrofits (indoors and in parking lots and streetlights) and mechanical system upgrades to chillers, boilers, pumps, motors, HVAC, and energy management software.
- Action 1.2.8. Coordinate with local school districts and Santa Rosa Junior College to facilitate energy and GHG reductions at educational facilities within Santa Rosa.
- Action 1.2.9. Continue to identify, implement, and monitor additional methods for reducing energy use from existing residential and non-residential properties to achieve the county-wide goal of retrofitting 80% of existing buildings. Utilize voluntary programs such as SCEIP, rebate

programs, energy rating systems, and energy-efficient mortgages. Monitor progress annually to determine if other retrofit programs are necessary to achieve reduction goals.

GHG Reduction:

2010: -380 $MTCO_2e$

2015: -20,140 $MTCO_2e$

2020: -103,390 $MTCO_2e$

2035: -112,870 $MTCO_2e$

Implementation Time Frame:	Near-Term
Implementing Department:	Community Development, Economic Development & Housing
Supporting Agencies:	Sonoma County Energy Independence Program
Mandatory or Voluntary:	Voluntary
2010 Performance Targets:	N/A
2015 Performance Targets:	15% of all buildings retrofitted
2020 Performance Targets:	80% of all buildings retrofitted
2035 Performance Targets:	95% of all buildings retrofitted

GHG Assumptions:

Voluntary conservation programs will result in 1% of the population, reducing their energy consumption by 10%.

SCEIP program participants and all other retrofit programs implemented will result in an average 30% energy savings in electricity and natural gas for each building.

GHG Sources:

City of Berkeley. 2010. Berkeley FIRST Initial Evaluation. Berkeley, CA.

Gardner, Stern. 2008. The Short List: The Most Effective Actions U.S. Households Can Take to Curb Climate Change. http://www.environmentmagazine.org/Archives/Back%20Issues/September-October%202008/gardner-stern-full.html.

Sonoma County. 2008. Community Climate Action Plan.

Sonoma County Energy Independence Program. 2011. http://www.sonomacountyenergy.org/.

U.S. Census Bureau. 2010. American Communities Survey 2005–2009 Santa Rosa, CA. http://factfinder.census.gov/servlet/ACSSAFFFacts?_event=Search&geo_id=&_geoContext=&_street=&_county=santa+rosa&_cityTown=santa+rosa&_state=04000US06&_zip=&_lang=en&_sse=on&pctxt=fph&pgsl=010.

1.3 SMART METER UTILIZATION

Encourage existing development and require new development to utilize PG&E's Smart Meter system to facilitate energy and cost savings.

Action Items:

- Action 1.3.1. Require new construction and major remodels to install real-time energy monitors that allow building users to track their current energy use.
- Action 1.3.2. Inform the community of metering options, such as online applications and in-home monitors.
- Action 1.3.3. Connect businesses and residents with rebate programs that give priority to appliances with smart grid technology.

GHG Reduction:

2010: -90 $MTCO_2e$

2015: -3,900 $MTCO_2e$

2020: -7,650 $MTCO_2e$

2035: -12,920 $MTCO_2e$

Implementation Time Frame:	Near-Term
Implementing Department:	Community Development, Utilities (for water-using appliances only) and a general fund department, as appropriate
Supporting Agencies:	PG&E
Mandatory or Voluntary:	Voluntary
2010 Performance Targets:	N/A
2015 Performance Targets:	30% of residential and 15% of non-residential customers with energy monitoring software
2020 Performance Targets:	50% of residential and 40% of non-residential customers with energy monitoring software
2035 Performance Targets:	75% of residential and 60% of non-residential customers with energy monitoring software

GHG Assumptions:

The use of smart meters and corresponding energy monitors will result in an average electricity savings of 7%. All new development will be required to provide a mechanism monitoring energy use inside the building.

GHG Sources:

Ehrhardt-Martinez, K., K. Donnely, and J. Laitner. 2010. Advanced Metering Initiatives and Residential Feedback Programs: A Meta-Review for Household Electricity-Savings Opportunities. Washington, D.C.: American Council for an Energy-Efficient Economy.

Pike Research. 2010. Smart appliance sales to start off slow, but 118 million units will be sold worldwide by 2019. http://www.smartgridnews.com/artman/publish/Smart-Grid-Press-Releases/Smart-appliance-sales-to-start-off-slow-but-118-million-units-will-be-sold-worldwide-by-2019-forecasts-Pike-Research-3290.html.

U.S. Department of Energy. 2008. Energy Star. Clothes Washer Product Snapshot. http://www.energystar.gov/ia/partners/reps/pt_reps_res_retail/files/CW_ProductSnapshot_May08.pdf

———. n.d. Energy Star. Residential New Construction: An Overview of Energy Use and Energy Efficiency Opportunities. http://www.energystar.gov/ia/business/challenge/learn_more/ResidentialNewConstruction.pdf.

1.4 TREE PLANTING AND URBAN FORESTRY

Plant and maintain trees on private property, streets, and open space areas.

Action Items:

- Action 1.4.1. Develop a tree inventory that identifies the types, ages, number, and location of trees in Santa Rosa.
- Action 1.4.2. Implement the City's tree preservation ordinance.
- Action 1.4.3. Require new development to supply an adequate number of street trees and private trees.
- Action 1.4.4. Create an Urban Greening Policy.
- Action 1.4.5. Develop a crowd-sourced web application allowing the community to enter information about public and private trees into a citywide database.

GHG Reduction:

2010: -250 $MTCO_2e$

2015: -750 $MTCO_2e$

2020: -1,640 $MTCO_2e$

2035: -5,220 $MTCO_2e$

Implementation Time Frame: Ongoing

Implementing Department: Community Development, Recreation, Parks & Community Services, IT

Supporting Agencies: N/A

Mandatory or Voluntary: Mandatory for new, voluntary for existing

2010 Performance Targets: 500 new trees planted per year

2015 Performance Targets: 700 new trees planted per year

2020 Performance Targets: 1,000 new trees planted per year

2035 Performance Targets: 1,000 new trees planted per year.

GHG Assumptions:

GHG reductions associated with tree plantings will result from increased shading and climate cooling, as well as carbon sequestration.

GHG Sources:

McHale, Melissa R., E. Gregory McPherson, and Ingrid C. Burke. 2007. The potential of urban tree plantings to be cost effective in carbon credit markets. Fort Collins, CO: Elsevier.

1.5 COOL ROOFS AND PAVEMENTS

Require new sidewalks, crosswalks, and parking lots to be made of cool paving materials with a high solar reflectivity.

Action Items:

- Action 1.5.1. Adopt an ordinance that requires and specifies cool paving materials for new parking lots, sidewalks, roofs, and crosswalks and integrates Low Impact Development guidelines for new construction and Capital Improvement Projects.
- Action 1.5.2. Ensure the cool roof and paving ordinance includes cool roof specifications which allow for green or living roofs and address energy installations on historic structures consistent with the Secretary of Interior's Rehabilitation Standards. Allow darker-color roofs when they meet cool roof standards.
- Action 1.5.3. Create a pilot program for a Green Streets Policy.

GHG Reduction:

2010: 0 $MTCO_2e$

2015: -110 $MTCO_2e$

2020: -250 $MTCO_2e$

2035: -650 $MTCO_2e$

Implementation Time Frame: Mid-Term

Implementing Department: Transportation & Public Works

Supporting Agencies: 0

Mandatory or Voluntary:	Mandatory
2010 Performance Targets:	N/A
2015 Performance Targets:	10% of roadway pavement to be replaced with high albedo materials
2020 Performance Targets:	25% of roadway pavement to be replaced with high albedo materials
2035 Performance Targets:	50% of roadway pavement to be replaced with high albedo materials

GHG Assumptions:

Urban roadways and parking lots built or replaced with high albedo pavements increase reflectivity, reduce urban temperatures, and can decrease building energy use.

GHG Sources:

Akbari, Hashem. Energy Savings Potentials and Air Quality Benefits of Urban Heat Island Mitigation. http://heatisland.lbl.gov/.

California Building Standards Commission. 2010. California Code of Regulations, Title 24: Part 11: California Green Building Standards Code. http://www.documents.dgs.ca.gov/bsc/CALGreen/2010_CA_Green_Bldg.pdf.

U.S. Environmental Protection Agency. 2005. Reducing Urban Heat Island Compendium of Strategies: Cool Pavements. http://www.epa.gov/heatisld/resources/pdf/CoolPavesCompendium.pdf.

1.6 ENERGY-EFFICIENT APPLIANCES

Facilitate the efficient use of energy for appliances in residential, commercial, and industrial buildings.

Action Items:

- Action 1.6.1. Seek funding to develop a rebate program for residents and businesses to exchange inefficient appliances with Energy Star certified models.

GHG Reduction:

2010: 0 $MTCO_2e$

2015: -410 $MTCO_2e$

2020: -520 $MTCO_2e$

2035: -860 $MTCO_2e$

Implementation Time Frame: Mid-Term

Implementing Department:	Utilities (for water-using appliances only) and a general fund department, as appropriate
Supporting Agencies:	N/A
Mandatory or Voluntary:	Voluntary
2010 Performance Targets:	N/A
2015 Performance Targets:	15% of all homes replace one major appliance
2020 Performance Targets:	15% of all homes replace one major appliance
2035 Performance Targets:	25% of all homes replace one major appliance

GHG Assumptions:

An appliance exchange program will reduce building energy use by replacing the most inefficient appliances with those that are Energy Star rated. On average, Energy Star products are between 15% and 45% more efficient than standard-model appliances.

GHG Sources:

National Renewable Energy Laboratory. 2009. Building America Research Benchmark Definition. http://www.nrel.gov/docs/fy10osti/47246.pdf.

U.S. Environmental Protection Agency. 2009. Energy Star and Other Climate Protection Partnerships, 2008 Annual Report. http://www.epa.gov/cpd/pdf/2008AnnualReportFinal.pdf.

1.7 APPLIANCE ELECTRIFICATION

Encourage residents and businesses to switch natural-gas-powered appliances to electric power, where appropriate.

Action Items:

- Action 1.7.1. Utilize the energy-efficient appliance rebate program to facilitate the replacement of natural gas equipment with electric-powered equipment.
- Action 1.7.2. Identify opportunities to implement additional programs that will switch appliances from natural gas to electricity.

GHG Reduction:

2010: 0 $MTCO_2e$

2015: -750 $MTCO_2e$

2020: -4,240 $MTCO_2e$

2035: -9,820 $MTCO_2e$

Implementation Time Frame: Mid-Term

Implementing Department:	Utilities (for water-using appliances only) and a general fund department, as appropriate
Supporting Agencies:	N/A
Mandatory or Voluntary:	Mandatory for new, voluntary for existing
2010 Performance Targets:	N/A
2015 Performance Targets:	10% of gas dryers and stoves replaced
2020 Performance Targets:	50% of gas dryers and stoves replaced
2035 Performance Targets:	80% of gas dryers and stoves replaced

GHG Assumptions:

As Santa Rosa's electricity supply becomes less GHG intensive through the use of cleaner sources, switching household appliances such as gas dryers and stoves will reduce GHG emissions.

GHG Sources:

National Renewable Energy Laboratory. 2009. Building America Research Benchmark Definition. http://www.nrel.gov/docs/fy10osti/47246.pdf.

U.S. Environmental Protection Agency. 2009. EnergyStar and Other Climate Protection Partnerships, 2008 Annual Report. http://www.epa.gov/cpd/pdf/2008AnnualReportFinal.pdf.

2.1 SMALL-SCALE RENEWABLE ENERGY INSTALLATIONS

Support the installation of small-scale renewable energy systems including solar photovoltaic, solar thermal, wind, and others.

Action Items:

- Action 2.1.1. Update the Zoning Code to define a renewable energy strategy that removes any barriers to small-scale renewable energy systems.
- Action 2.1.2. Implement a Solar Policy. Revise the permit processes and fees as appropriate to remove barriers to and incentivize the installation of renewable energy systems in accordance with applicable safety and environmental standards.
- Action 2.1.3. Consider requiring new homes and businesses to be pre-wired and pre-plumbed for solar, wind, solar thermal installations, and electric vehicle charging stations.
- Action 2.1.4. Create and prioritize municipal projects that incorporate or generate renewable energy.

GHG Reduction:

2010: Supports Implementation of Measure 2.2

2015: Supports Implementation of Measure 2.2

2020: Supports Implementation of Measure 2.2

2035: Supports Implementation of Measure 2.2

Implementation Time Frame: Near-Term

Implementing Department: Community Development

Supporting Agencies: N/A

Mandatory or Voluntary: Mandatory

2010 Performance Targets: N/A

2015 Performance Targets: N/A

2020 Performance Targets: N/A

2035 Performance Targets: N/A

GHG Assumptions:

N/A

GHG Sources:

N/A

2.2 RENEWABLE ENERGY FINANCING

Connect property owners with low-interest financing opportunities for renewable energy installations.

Action Items:

- Action 2.2.1. Continue to partner with SCEIP to provide Property Assessed Clean Energy (PACE) or equivalent financing for solar installations.
- Action 2.2.2. Explore and advocate for a regional or statewide Feed-In Tariff (FIT) to spur the installation of mid-sized renewable energy installations.

GHG Reduction:

2010: N/A

2015: -8,200 $MTCO_2e$

2020: -20,790 $MTCO_2e$

2035: -27,280 $MTCO_2e$

Implementation Time Frame:	Mid-Term
Implementing Department:	Community Development
Supporting Agencies:	Sonoma County Energy Independence Program
Mandatory or Voluntary:	Voluntary
2010 Performance Targets:	N/A
2015 Performance Targets:	50% of SCEIP participants and 25% of retofitted buildings to install renewable energy
2020 Performance Targets:	60% of SCEIP participants and 25% of retrofitted buildings to install renewable energy
2035 Performance Targets:	75% of SCEIP participants and 25% of retrofitted buildings to install renewable energy

GHG Assumptions:

Current PV solar installations through the California Solar Initiative and SCEIP programs will continue at similar rates and average installation sizes for residential (4.83 kW) and non-residential.

GHG Sources:

Local Government Commission. 2010. Local Government Energy Efficiency Best Practices: Sonoma County Energy Independence Program Case Study.
http://www.lgc.org/freepub/docs/energy/case_studies/SCEIP.pdf.

2.3 RENEWABLE POWER GENERATION

Establish a comprehensive renewable energy program that would allow the Santa Rosa community to generate or receive electricity where a minimum of 50% comes from renewable energy sources by 2020 and 70% by 2035.

Action Items:

- Action 2.3.1. Set the renewable power generation goal via Council resolution for the City to increase community-wide energy generation as described above.
- Action 2.3.2. Work with PG&E to reduce GHG emissions from energy use through an increase in the renewable portfolio for the residents and businesses in Santa Rosa.
- Action 2.3.3. Collaborate with neighboring jurisdictions and Sonoma County to explore the feasibility and cost of a Community Choice Aggregation program.
- Action 2.3.4. Evaluate opportunities to modify the Zoning Code and ensure mid-size (up to 5 MW) renewable energy development projects are allowed in appropriate locations with a clear and streamlined approval process.

GHG Reduction:

2010: N/A

2015: -22,180 $MTCO_2e$

2020: -56,040 $MTCO_2e$

2035: -58,240 $MTCO_2e$

Implementation Time Frame: Long-Term

Implementing Department: Utilities

Supporting Agencies: PG&E, Sonoma County

Mandatory or Voluntary: Mandatory

2010 Performance Targets: N/A

2015 Performance Targets: 35% of all electricity from renewable energy sources

2020 Performance Targets: 50% of all electricity from renewable energy sources

2035 Performance Targets: 70% of all electricity from renewable energy sources

GHG Assumptions:

The GHG reductions associated with increased renewable energy use are only for achieving percentages higher than what is anticipated by PG&E in 2015, 2020, and 2035. This measure assumes a model similar to the Marin Energy Authority, which provides customers with the option to utilize the minimum renewable energy portfolio or to pay a premium for 100% renewable energy. This model will result in a total of 35% of electricity from renewable sources by 2015, 75% by 2020, and 90% by 2035.

GHG Sources:

CPUC. 2009. 33% Renewable Portfolios Standard Implementation Analysis Report. http://www.cpuc.ca.gov/NR/rdonlyres/1865C207-FEB5-43CF-99EB-A212B78467F6/0/33PercentRPSImplementationAnalysisInterimReport.pdf.

Marin Energy Authority. 2010. Marin Clean Energy Implementation Plan. http://marincleanenergy.info/images/stories/PDF/MEA_Implementation_Plan_Jan_2010.pdf.

3.1 DENSITY

Increase the jobs and housing density in Santa Rosa's downtown core and areas near transit centers and transit corridors.

Action Items:

- Action 3.1.1. Continue to support the Urban Growth Boundary to facilitate infill development.
- Action 3.1.2. Implement the City's Station Area Plans, Specific Plans, and Corridor Plans.

GHG Reduction:

2010: N/A

2015: -5,450 $MTCO_2e$

2020: -11,680 $MTCO_2e$

2035: -10,780 $MTCO_2e$

Implementation Time Frame: Long-Term

Implementing Department: Community Development

Supporting Agencies: Sonoma County Transportation Authority

Mandatory or Voluntary: Mandatory

2010 Performance Targets: N/A

2015 Performance Targets: 15% of new development will implement denser development

2020 Performance Targets: 15% of new development will implement denser development

2035 Performance Targets: 15% of new development will implement denser development

GHG Assumptions:

The increased connectivity and density within Santa Rosa will decrease the distances that will need to be traveled to reach jobs, housing, services, and other amenities by approximately 1.5% by 2020. Decreased distances between land uses will not only reduce VMT, but will also make it more convenient to utilize non-auto modes of travel.

GHG Sources:

California Air Pollution Control Officers Association. 2010. Quantifying Greenhouse Gas Mitigation Measures.

3.2 DIVERSITY AND DESTINATION ACCESSIBILITY

Plan for a variety of complementary land uses within walking distance of each other, such as housing, neighborhood-serving retail, and recreational facilities, to decrease the need for vehicular travel.

Action Items:

- Action 3.2.1. Work with new, major employers to ensure that everyday services like dry cleaning, child care, and ATMs are on-site or near the place of employment.

- Action 3.2.2. Improve the non-vehicular transportation network serving common destinations in Santa Rosa in order to facilitate walking and biking.

- Action 3.2.3. Support the mixed-use nature of the downtown area and other new, higher-density developments near services.

GHG Reduction:

2010: N/A

2015: -320 $MTCO_2e$

2020: -6,270 $MTCO_2e$

2035: -7,840 $MTCO_2e$

Implementation Time Frame: Long-Term

Implementing Department: Community Development

Supporting Agencies: Sonoma County Transportation Authority

Mandatory or Voluntary: Voluntary

2010 Performance Targets: N/A

2015 Performance Targets: 20% of new projects will be built in close proximity to downtown

2020 Performance Targets: 20% of new projects will be built in close proximity to downtown

2035 Performance Targets: 20% of new projects will be built in close proximity to downtown

GHG Assumptions:

Increased diversity of land uses in Santa Rosa will decrease the necessary time and distance to be traveled between jobs, housing, services, and other amenities. This increased diversity will result in approximately 1% reduction in VMT.

GHG Sources:

California Air Pollution Control Officers Association. 2010. Quantifying Greenhouse Gas Mitigation Measures.

3.3 AFFORDABLE HOUSING

Support the development of an adequate amount of affordable housing in Santa Rosa.

Action Items:

- Action 3.3.1. Provide affordable housing development near transit stops and centers in Santa Rosa.

- Action 3.3.2 Implement the Housing Allocation Plan, the City's inclusionary housing ordinance.

GHG Reduction:

2010: N/A

2015: -320 $MTCO_2e$

2020: -960 $MTCO_2e$

2035: -1,480 $MTCO_2e$

Implementation Time Frame: Long-Term

Implementing Department: Community Development

Supporting Agencies: Sonoma County Housing Authority

Mandatory or Voluntary: Mandatory

2010 Performance Targets: N/A

2015 Performance Targets: 5% of all city housing will be affordable

2020 Performance Targets: 5% of all city housing will be affordable

2035 Performance Targets: 5% of all city housing will be affordable

GHG Assumptions:

Providing additional affordable housing opportunities will result in a 4% decrease in household VMT per new affordable housing unit.

GHG Sources:

California Air Pollution Control Officers Association. 2010. Quantifying Greenhouse Gas Mitigation Measures.

3.4 PARKING SUPPLY LIMITS

Limit the amount of free parking in high traffic areas.

Action Items:

- Action 3.4.1. Price on-street parking relative to congestion.
- Action 3.4.2. Implement the City's residential parking permit program near high-traffic areas to avoid spillover parking.
- Action 3.4.3. Evaluate the Zoning Code for amendments to reduce parking requirements where alternative transportation is available or planned.

GHG Reduction:

2010: N/A

2015: -4,810 $MTCO_2e$

2020: -12,030 $MTCO_2e$

2035: -16,840 $MTCO_2e$

Implementation Time Frame: Near-Term

Implementing Department: Community Development, Economic Development & Housing, Transportation & Public Works

Supporting Agencies: N/A

Mandatory or Voluntary: N/A

2010 Performance Targets: N/A

2015 Performance Targets: 10% of City parking will be priced to encourage efficient parking

2020 Performance Targets: 10% of City parking will be priced to encourage efficient parking

2035 Performance Targets: 10% of City parking will be priced to encourage efficient parking

GHG Assumptions:

Increased parking fees in the downtown will be priced to encourage "park once" behavior by users and encourage increased transit and non-auto trips to the downtown.

GHG Sources:

California Air Pollution Control Officers Association. 2010. Quantifying Greenhouse Gas Mitigation Measures.

3.5 UNBUNDLE PARKING COSTS

Unbundle the price of parking from property costs

Action Items:

- Action 3.5.1. Investigate mechansims to unbundle parking costs from rent or property costs for new development.
- Action 3.5.2. Implement a parking policy which would encourage unbundled parking.

GHG Reduction:

2010: N/A

2015: -640 $MTCO_2e$

2020: -940 $MTCO_2e$

2035: -2,220 $MTCO_2e$

Implementation Time Frame: Mid-Term

Implementing Department: Community Development

Supporting Agencies: N/A

Mandatory or Voluntary: Voluntary

2010 Performance Targets: N/A

2015 Performance Targets: 10% of potential parking supply will be unbundled from property costs

2020 Performance Targets: 10% of potential parking supply will be unbundled from property costs

2035 Performance Targets: 10% of potential parking supply will be unbundled from property costs

GHG Assumptions:

The VMT reductions associated with this measure assume that on average a 10% unbundled parking reduction will occur for all new non-single-family residential developments and will result in approximately 0.15% reduction in VMT by 2020 and 0.3% by 2035.

GHG Sources:

California Air Pollution Control Officers Association. 2010. Quantifying Greenhouse Gas Mitigation Measures.

3.6 TRAFFIC CALMING

Provide traffic calming measures to encourage people to walk or bike instead of drive.

Action Items:

- Action 3.6.1. Install traffic-calming design features such as bulb-outs, median barriers, and striped crosswalks to improve pedestrian convenience and encourage pedestrian and bicycle travel.

GHG Reduction:

2010: N/A

2015: -320 $MTCO_2e$

2020: -800 $MTCO_2e$

2035: -740 $MTCO_2e$

Implementation Time Frame: Long-Term

Implementing Department:	Transportation & Public Works
Supporting Agencies:	N/A
Mandatory or Voluntary:	N/A
2010 Performance Targets:	N/A
2015 Performance Targets:	20% of City will have improved pedestrian connections
2020 Performance Targets:	20% of City will have improved pedestrian connections
2035 Performance Targets:	20% of City will have improved pedestrian connections

GHG Assumptions:

Continuing to improve and renovate streets to accommodate all transportation user modes will provide a safer pedestrian environment and encourage residents to make trips by foot or other alternative modes instead of by car. This analysis estimates that traffic calming features will encourage increased walking, resulting in a VMT reduction of 0.2% by 2035.

GHG Sources:

California Air Pollution Control Officers Association. 2010. Quantifying Greenhouse Gas Mitigation Measures.

4.1 BICYCLE AND PEDESTRIAN NETWORK

Improve the bicycle and pedestrian network in Santa Rosa through design elements, training, and facilities.

Action Items:

- Action 4.1.1. Implement the Bicycle and Pedestrian Master Plan.
- Action 4.1.2. Update bicycle parking regulations for multi-family homes and commercial businesses to increase bicycle parking citywide.
- Action 4.1.3. Provide bike safety training to residents, employees, and motorists.
- Action 4.1.4. Continue to support the Safe Routes to School (SRTS) and safe routes to transit programs in Santa Rosa.
- Action 4.1.5. Implement a bike-share program.

GHG Reduction:

2010: N/A

2015: -960 $MTCO_2e$

2020: -1,880 $MTCO_2e$

2035: -3,690 $MTCO_2e$

Implementation Time Frame: Mid-Term

Implementing Department: Community Development, Transportation & Public Works

Supporting Agencies: Sonoma County Bicycle Coalition

Mandatory or Voluntary: N/A

2010 Performance Targets: Miles of bike lanes installed

2015 Performance Targets: Miles of bike lanes installed

2020 Performance Targets: Miles of bike lanes installed

2035 Performance Targets: Miles of bike lanes installed

GHG Assumptions:

Implementation of the City's Bicycle Master Plan will provide significant opportunities for the community to utilize non-auto modes of transportation rather than vehicles, resulting in a 0.5% decrease in VMT by 2035.

GHG Sources:

California Air Pollution Control Officers Association. 2010. Quantifying Greenhouse Gas Mitigation Measures.

4.2 TRANSIT SYSTEM IMPROVEMENTS

Improve the frequency, efficiency, reliability, and safety of transit to, from, and within Santa Rosa.

Action Items:

- Action 4.2.1. Implement an Automated Vehicle Location (AVL) system to improve transit system management and performance and to provide real-time arrival and departure data to transit riders through smart phone applications and other technologies.
- Action 4.2.2. Improve the quality and safety of transit centers and bus stops by providing energy-efficient lighting, real-time transit arrival data, and adequate space to wait for buses and for buses to board passengers.
- Action 4.2.3. Support the establishment of SMART rail service.
- Action 4.2.4. Explore the option of implementing high frequency and rapid bus routes along major transit corridors.
- Action 4.2.5. Guide replacement of fleet vehicles and buses to reduce GHGs by periodic analysis of alternative propulsion systems. Adopt a policy to incrementally replace fleet vehicles and buses to aggressively implement GHG reductions.

- Action 4.2.6. Evaluate transportation system performance on an ongoing basis and adjust service as necessary to maximize transit trips provided.

- Action 4.2.7. Expand transit ridership by identifying measures such as evaluating fare policy and collection practices, utilizing universal fare cards, exploring electronic fare media, and decreasing loading time.

GHG Reduction:

2010: N/A

2015: -1,280 $MTCO_2e$

2020: -6,410 $MTCO_2e$

2035: -6,410 $MTCO_2e$

Implementation Time Frame:	Near-Term
Implementing Department:	Transit, Community Development, Transportation & Public Works
Supporting Agencies:	Sonoma County Transportation Authority
Mandatory or Voluntary:	N/A
2010 Performance Targets:	N/A
2015 Performance Targets:	5% increase in transit trips
2020 Performance Targets:	10% increase in transit trips
2035 Performance Targets:	25% increase in transit trips

GHG Assumptions:

Through these improvements in transit operations, it is estimated that transit ridership will increase by approximately 10% by 2020 and 25% by 2035. It is estimated that approximately 50% of those additional transit trips would have otherwise been made by car. This increased used of transit will result in approximately 0.6% decrease in VMT by 2035.

GHG Sources:

California Air Pollution Control Officers Association. 2010. Quantifying Greenhouse Gas Mitigation Measures.

4.3 CAR SHARING AND TRANSPORTATION DEMAND MANAGEMENT PROGRAMS

Increase the number of shared trips and transit trips, and establish car sharing as a viable alternative to owning a car.

Action Items:

- Action 4.3.1. Work with car-sharing companies to establish a car-sharing operation in Santa Rosa.
- Action 4.3.2. Work with large employers in Santa Rosa to create rideshare programs, including carpool and vanpool options for employees.
- Action 4.3.3. Evaluate the effectiveness and consider expanding existing programs including guaranteed ride home, employee transit pass programs, and cash for parking pass programs.
- Action 4.3.4. Provide recognition, awards, competitions, or other incentives related to employee commutes in regard to walking, biking, carpooling, transit, or other non-single-occupancy vehicle use.
- Action 4.3.5. Encourage new developments with more than 50 on-site employees to provide subsidized or free transit passes to employees.
- Action 4.3.6. Seek funding and work with Santa Rosa Junior College and local school districts to reinstate subsidized transit passes to junior college and high school students.
- Action 4.3.7. Identify locations for additional park-and-ride lots.

GHG Reduction:

2010: N/A

2015: -320 $MTCO_2e$

2020: -4,010 $MTCO_2e$

2035: -4,010 $MTCO_2e$

Implementation Time Frame:	Near-Term
Implementing Department:	Community Development, Transit, Transportation & Public Works
Supporting Agencies:	Sonoma County
Mandatory or Voluntary:	Voluntary
2010 Performance Targets:	N/A
2015 Performance Targets:	2% increase in rideshare participation
2020 Performance Targets:	25% increase in rideshare participation
2035 Performance Targets:	25% increase in rideshare participation

GHG Assumptions:

The increased availability and participation in car-sharing programs has been found to decrease VMT and even car ownership. It is estimated that the expansion of car-sharing programs will result in an approximate 0.2% decrease in VMT.

GHG Sources:

California Air Pollution Control Officers Association. 2010. Quantifying Greenhouse Gas Mitigation Measures.

4.4 CAR-FREE SUNDAYS

Consider establishing a Car-Free Sunday community event to demonstrate non-vehicular uses for streets.

Action Items:

- Action 4.4.1. Designate a few Sundays each year as car-free days. Rotate the car-free area from neighborhood to neighborhood and encourage alternate modes of travel.

GHG Reduction:

2010: GHG reduction not currently quantifiable.

2015: GHG reduction not currently quantifiable.

2020: GHG reduction not currently quantifiable.

2035: GHG reduction not currently quantifiable.

Implementation Time Frame:	Near-Term
Implementing Department:	Community Development, Transportation & Public Works
Supporting Agencies:	Santa Rosa Chamber of Commerce
Mandatory or Voluntary:	Voluntary
2010 Performance Targets:	Number of Car-Free Sundays
2015 Performance Targets:	Number of Car-Free Sundays
2020 Performance Targets:	Number of Car-Free Sundays
2035 Performance Targets:	Number of Car-Free Sundays

GHG Assumptions:

At this time, the VMT reduction or GHG emissions impact of hosting Car-Free Sundays cannot be quantified due to uncertainty in how effective Car-Free Sundays may be in Santa Rosa.

GHG Sources:

N/A

4.5 TELECOMMUTING

Encourage the development of remote work centers and telecommuting practices.

Action Items:

- Action 4.5.1. Promote workplace alternatives, including telecommuting and home occupations.

GHG Reduction:

2010: N/A

2015: -520 $MTCO_2e$

2020: -830 $MTCO_2e$

2035: -1,850 $MTCO_2e$

Implementation Time Frame: Mid-Term

Implementing Department: Community Development

Supporting Agencies: Sonoma County

Mandatory or Voluntary: Voluntary

2010 Performance Targets: N/A

2015 Performance Targets: 3% of residents will telecommute 1 day every 2 weeks

2020 Performance Targets: 5% of residents will telecommute 1 day every 2 weeks

2035 Performance Targets: 10% of residents will telecommute 1 day every 2 weeks

GHG Assumptions:

Telecommute programs and centers may create an alternative to long commutes, which may be acceptable by employers. The U.S. Census Bureau estimates that more than 10,000 residents in Santa Rosa have a daily one-way commute longer than 50 miles. The development of telecommuting centers will result in 5% of residents commuting one less day per every two weeks.

GHG Sources:

U.S. Census Bureau, Center for Economic Studies. 2011. Longitudinal Employer-Household Demographics, Distance Direction Analysis. http://lehdmap.did.census.gov/.

5.1 ELECTRIC AND HYBRID-ELECTRIC VEHICLES

Facilitate the purchase and convenient use of electric and hybrid vehicles in Santa Rosa.

Action Items:

- Action 5.1.1. Provide electric vehicle recharging stations in City facilities and parking lots that are equipped with solar-generated power.
- Action 5.1.2. Amend the Zoning Code to require new parking lots to provide electric vehicle recharging.
- Action 5.1.3. Allow EV charging stations as permitted uses in larger parking lots.
- Action 5.1.4. Provide prioritized parking spots to electric and hybrid vehicles in City parking lots.
- Action 5.1.5. Consider a program that provides rebates for employees who purchase electric vehicles.
- Action 5.1.6. Continue to expand the electric vehicle charging network.

GHG Reduction:

2010: N/A

2015: -1,240 $MTCO_2e$

2020: -2,600 $MTCO_2e$

2035: -26,430 $MTCO_2e$

Implementation Time Frame:	Ongoing
Implementing Department:	Community Development, Economic Development & Housing
Supporting Agencies:	Sonoma County
Mandatory or Voluntary:	Mandatory
2010 Performance Targets:	N/A
2015 Performance Targets:	2% of new parking spaces provide EV charging station
2020 Performance Targets:	2% of new parking spaces provide EV charging station
2035 Performance Targets:	2% of new parking spaces provide EV charging station

GHG Assumptions:

This measure quantifies the VMT and fuel savings impacts of expanded use of electric vehicles through the installation of public and private electric vehicle charging stations. It is anticipated that

approximately 2% of all new parking spaces will be installed with electric vehicle charging stations and that half of the electricity needed will be generated through solar PV systems.

GHG Sources:

California Air Pollution Control Officers Association. 2010. Quantifying and Mitigating Greenhouse Gas Emissions.

California Building Standards Commission. 2010. 2010 California Green Building Standards Code; California Code of Regulations Title 24, Part 11.

California Department of Transportation. 2009. High Occupancy Vehicle Report. http://www.dot.ca.gov/dist4/highwayops/docs/hov_report_2009.pdf.

Department of Transportation. 2001. National Household Travel Survey. Washington, D.C.

Idaho National Laboratory. 2006. Full Size Electric Vehicles: Advanced Vehicle Testing Reports.

5.2 BIOFUEL, FUEL CELL, AND ALTERNATIVE FUELS

Support the State's implementation of the Low Carbon Fuel Standard and facilitate the use of alternative fuels in Santa Rosa.

Action Items:

- Action 5.2.1. Require new refueling stations to provide biodiesel fuel, compressed natural gas, liquefied natural gas, electric vehicle charging stations, or other alternative fuels.
- Action 5.2.2. Offer guidance and education about diesel-to-biodiesel conversions.
- Action 5.2.3. Utilize the city's wastewater treatment plant to develop a tri-generation fuel cell that can produce hydrogen, in addition to electricity and heat, to provide fuel for City vehicles and/or the public.
- Action 5.2.4. Secure grants and funding to work with existing and new fuel providers to develop alternative fueling stations in Santa Rosa.
- Action 5.2.5. Work with Santa Rosa Junior College to increase participation in alternative fuel technology classes.

GHG Reduction:

2010: N/A

2015: -17,280 $MTCO_2e$

2020: -52,480 $MTCO_2e$

2035: -86,350 $MTCO_2e$

Implementation Time Frame: Long-Term

Implementing Department:	Community Development, Transportation & Public Works, Utilities
Supporting Agencies:	Sonoma County
Mandatory or Voluntary:	Mandatory
2010 Performance Targets:	N/A
2015 Performance Targets:	Number of alternative fueling stations
2020 Performance Targets:	Number of alternative fueling stations
2035 Performance Targets:	Number of alternative fueling stations

GHG Assumptions:

This measure quantifies the benefit of the State implementing the Low Carbon Fuel Standard program and ensures that the Santa Rosa community can utilize these fuels to reduce GHG emissions from vehicle fuels by approximately 7.2%.

GHG Sources:

California Air Resources Board. 2010. Low Carbon Fuel Standard Implementation Analysis.

5.3 ANTI-IDLING

Limit both commercial truck and passenger vehicle idling in Santa Rosa.

Action Items:

- Action 5.3.1. Work with local law enforcement to enforce state idling requirements for commercial vehicles.
- Action 5.3.2. Create a program at local schools to encourage parents and guardians to shut off their cars when waiting to pick up children.
- Action 5.3.3. Consider an amendment to the Zoning Code to prohibit new drive-through facilities.

GHG Reduction:

2010: N/A

2015: -900 $MTCO_2e$

2020: -2,140 $MTCO_2e$

2035: -4,340 $MTCO_2e$

Implementation Time Frame:	Near-Term
Implementing Department:	Police, Community Development
Supporting Agencies:	N/A

Mandatory or Voluntary:	Mandatory
2010 Performance Targets:	N/A
2015 Performance Targets:	10% decrease in commercial vehicles and 15% decrease in school zone idling
2020 Performance Targets:	25% decrease in commercial vehicles and 35% decrease in school zone idling
2035 Performance Targets:	40% decrease in commercial vehicles and 75% decrease in school zone idling

GHG Assumptions:

It is anticipated that a 25% decrease in heavy-duty vehicle idling as well as a 35% decrease in school-related idling through effective education and enforcement will decrease GHG emissions associated with vehicle idling.

GHG Sources:

Cobb County. 2008. http://www.cobbcountyga.gov/green/downloads/meassure37-reduction.pdf.

UC Davis. 2004. Heavy Duty Truck Idling Characteristics. http://www.its.ucdavis.edu/publications/2004/UCD-ITS-RP-04-38.pdf.

5.4 NEIGHBORHOOD ELECTRIC VEHICLES

Facilitate the use of neighborhood electric vehicles (NEVs).

Action Items:

- Action 5.4.1. Identify streets appropriate for neighborhood electric vehicle use.
- Action 5.4.2. Create a NEV network plan to ensure streets appropriate for NEV use are connected and close to services.
- Action 5.4.3. Partner with the BAAQMD or the California Air Resources Board to provide rebates for residents and businesses that purchase an NEV.
- Action 5.4.4. Develop a map and signage to show the NEV network.

GHG Reduction:

2010: N/A

2015: -560 $MTCO_2e$

2020: -2,630 $MTCO_2e$

2035: -4,950 $MTCO_2e$

Implementation Time Frame:	Mid-Term
Implementing Department:	Transportation & Public Works
Supporting Agencies:	N/A
Mandatory or Voluntary:	Voluntary
2010 Performance Targets:	N/A
2015 Performance Targets:	500 NEVs in use
2020 Performance Targets:	2,500 NEVs in use
2035 Performance Targets:	5,000 NEVs in use

GHG Assumptions:

Neighborhood electric vehicles are an effective form of transportation for short trips and on appropriate streets. It is estimated that households with NEVs reduce VMT from traditional vehicles by approximately 12%.

GHG Sources:

California Air Pollution Control Officers Association. 2010. Quantifying and Mitigating Greenhouse Gas Emissions.

6.1 RECYCLING AND COMPOSTING

Increase the amount of waste that is recycled and composted.

Action Items:

- Action 6.1.1. Work with local waste haulers to improve the amount and types of waste that are accepted for curbside recycling and green waste pickup. Conduct outreach to and education of the public for dissemination of the information and options.
- Action 6.1.2. Work with the Sonoma County Waste Management Authority to encourage local restaurants to compost food and provide recyclable or compostable to-go containers.
- Action 6.1.3. Increase the City's construction and demolition ordinance to require 75% diversion by 2020 and 85% diversion by 2035.

GHG Reduction:

2010: N/A

2015: -25,170 $MTCO_2e$

2020: -64,370 $MTCO_2e$

2035: -129,720 $MTCO_2e$

Implementation Time Frame:	Mid-Term
Implementing Department:	Transportation & Public Works, Community Development
Supporting Agencies:	Sonoma County Waste Management Authority
Mandatory or Voluntary:	Mandatory
2010 Performance Targets:	68% diversion rate or 4.6 pounds per person per day
2015 Performance Targets:	75% diversion rate or 3.6 pounds per person per day
2020 Performance Targets:	85% diversion rate or 2.2 pounds per person per day
2035 Performance Targets:	95% diversion rate or 1.0 pounds per person per day

GHG Assumptions

Increasing the amount of waste diverted from the landfill from 63% to 95% by 2035 will result in decreased methane production and reduced GHG emissions.

GHG Sources:

California Integrated Waste Management Board. 2004. Statewide Waste Characterization Study. Sacramento: California Integrated Waste Management Board.

6.2 MATERIALS MANAGEMENT

Reduce the availability or use of common materials that are not recyclable or that are not cost-effective to recycle.

Action Items:

- Action 6.2.1. Discourage the use of Styrofoam containers and plastic bags.
- Action 6.2.2. Encourage local businesses to reduce amounts of packaging used.
- Action 6.2.3. Discourage the use of bottled water at City events.
- Action 6.2.4. Adopt a long-term waste diversion goal to extend beyond the Sonoma County Waste Management Agency's goal of a 70% diversion rate by 2015 and the State's goal of 75% diversion by 2020 consistent with state law AB 341.

GHG Reduction:

2010: Supports implementation of Measure 6.1

2015: Supports implementation of Measure 6.1

2020: Supports implementation of Measure 6.1

2035: Supports implementation of Measure 6.1

Implementation Time Frame:	Long-Term
Implementing Department:	Transportation & Public Works, Community Development
Supporting Agencies:	Sonoma County Waste Management Authority
Mandatory or Voluntary:	Mandatory
2010 Performance Targets:	68% diversion rate or 4.6 pounds per person per day
2015 Performance Targets:	75% diversion rate or 3.6 pounds per person per day
2020 Performance Targets:	85% diversion rate or 2.2 pounds per person per day
2035 Performance Targets:	95% diversion rate or 1.0 pounds per person per day

GHG Assumptions:

Increasing the amount of waste diverted from the landfill from 63% to 95% by 2035 will result in decreased methane production and reduced GHG emissions. The intent of this measure is to support successful achievement of the waste diversion goals set in Measure 6.1.

GHG Sources:

California Integrated Waste Management Board. 2004. Statewide Waste Characterization Study. Sacramento: California Integrated Waste Management Board.

7.1 WATER CONSERVATION

Continue to require and incentivize water conservation.

Action Items:

- Action 7.1.1. Require new development to reduce potable water use in accordance with the Tier 1 standards of CALGreen.
- Action 7.1.2. Continue and expand water conservation efforts including water-efficient landscaping, rainwater harvesting, and high-efficiency appliance and fixture installations.
- Action 7.1.3. Replace water meters in Santa Rosa with meters that allow residents and businesses to track real-time water use through the City's online web application.
- Action 7.1.4. Encourage existing development and require new development to utilize smart water meters to facilitate water and cost savings.

GHG Reduction:

2010: N/A

2015: -1,170 $MTCO_2e$

2020: -1,700 $MTCO_2e$

2035: -2,210 $MTCO_2e$

Implementation Time Frame: Mid-Term

Implementing Department: Utilities

Supporting Agencies: Sonoma County Water Authority

Mandatory or Voluntary: Mandatory for New, Voluntary for Existing

2010 PerformanceTargets: 130 gallons per capita per day

2015 Performance Targets: 125 gallons per capita per day

2020 Performance Targets: 122 gallons per capita per day

2035 Performance Targets: 110 gallons per capita per day

GHG Assumptions:

Implementation of the Tier 1 standards of CALGreen and implementation of best management practices to meet the 20x2020 requirements will result in a decrease from 134 gallons per capita per day (GPCD) in 2007 to 119 GPCD by 2035.

GHG Sources:

City of Santa Rosa. 2011. 2010 Urban Water Management Plan. http://ci.santa-rosa.ca.us/doclib /Documents/Final_2010_UWMP_Complete_CityofSantaRosa.pdf.

7.2 WASTEWATER AND WATER OPERATIONS

Improve the efficiency of water and wastewater facilities and operations serving the Santa Rosa community.

Action Items:

- Action 7.2.1. Continue to provide recycled water to the Geysers project to generate clean energy.
- Action 7.2.2. Continue to develop and install innovative renewable energy projects at the Laguna Treatment Plant.

GHG Reduction:

2010: N/A

2015: -1,240 $MTCO_2e$

2020: -2,050 $MTCO_2e$

2035: -3,960 $MTCO_2e$

Implementation Time Frame: Mid-Term

Implementing Department: Utilities
Supporting Agencies: Subregional Water Reuse System Partners
Mandatory or Voluntary: N/A
2010 Performance Targets: N/A
2015 Performance Targets: 10% energy savings
2020 Performance Targets: 15% energy savings
2035 Performance Targets: 35% energy savings

GHG Assumptions:

The City's water and wastewater treatment facilities are significant sources of energy use within the city. The City will continue to improve the efficiency and operations of these plants with a goal to achieve a 10% reduction in energy by 2015, 15% by 2020, and 35% by 2035.

GHG Sources:

City of Santa Rosa. 2011. 2010 Urban Water Management Plan. http://ci.santa-rosa.ca.us/doclib/Documents/Final_2010_UWMP_Complete_CityofSantaRosa.pdf.

7.3 RECYCLED WATER

Increase the use of recycled water in Santa Rosa.

Action Items:

- Action 7.3.1. Expand the infrastructure network to deliver recycled water for use at businesses, city parks and facilities, and common area residential landscapes.
- Action 7.3.2. Require new development in zones anticipated to receive future recycled water to meet on-site meter separation requirements to allow for the use of recycled water.

GHG Reduction:

2010: Supportive Measure
2015: Supportive Measure
2020: Supportive Measure
2035: Supportive Measure
Implementation Time Frame: Long-Term
Implementing Department: Utilities
Supporting Agencies: Subregional Water Reuse System Partners
Mandatory or Voluntary: Mandatory for new, voluntary for existing

2010 recycled water use:: 204 acre-feet of recycled water

2015 Performance Targets: 350 acre-feet of recycled water

2020 Performance Targets: 350 acre-feet of recycled water

2035 Performance Targets: 1,100 acre-feet of recycled water

GHG Assumptions:

While energy reductions may not occur through increased use of recycled water, this measure will provide Santa Rosa with future water security.

GHG Sources:

City of Santa Rosa. 2011. 2010 Urban Water Management Plan. http://ci.santa-rosa.ca.us/doclib /Documents/Final_2010_UWMP_Complete_CityofSantaRosa.pdf.

8.1 LOCAL FOOD SYSTEMS

Increase the amount of food grown and consumed locally.

Action Items:

- Action 8.1.1. Incentivize residential agriculture.
- Action 8.1.2. Promote the growing of fruits and vegetables in front yards.
- Action 8.1.3. Establish community gardens and urban farms throughout the city.
- Action 8.1.4. Revise the City's Zoning Code to allow for small animals, chickens, and bees.
- Action 8.1.5. Promote a Santa Rosa Slow Food campaign for local organic restaurants and wineries.

GHG Reduction:

2010: Supportive Measure

2015: Supportive Measure

2020: Supportive Measure

2035: Supportive Measure

Implementation Time Frame: Mid-Term

Implementing Department: Community Development, Recreation, Parks & Community Services

Supporting Agencies: N/A

Mandatory or Voluntary: Voluntary

2010 Performance Targets: N/A

2015 Performance Targets: Number of community and residential gardens

2020 Performance Targets: Number of community and residential gardens

2035 Performance Targets: Number of community and residential gardens

GHG Assumptions:

N/A

GHG Sources:

N/A

9.1 LAWN AND GARDEN ACTIVITY

Encourage the use of electrified and higher-efficiency lawn and garden equipment.

Action Items:

- Action 9.1.1. Support the BAAQMD's efforts to re-establish a voluntary exchange program for residential lawn mowers and backpack-style leaf blowers.
- Action 9.1.2. Encourage new buildings to provide electrical outlets on the exterior in an accessible location to charge electric-powered lawn and garden equipment.
- Action 9.1.3. Encourage the replacement of existing high maintenance and high water use landscapes (such as removing turf through the Green Exchange rebate program) with low water use vegetation to reduce the need for gas-powered lawn and garden equipment.

GHG Reduction:

2010: 0

2015: -10 $MTCO_2e$

2020: -20 $MTCO_2e$

2035: -50 $MTCO_2e$

Implementation Time Frame: Mid-Term

Implementing Department: Community Development, Utilities

Supporting Agencies: Bay Area Air Quality Management District

Mandatory or Voluntary: Voluntary

2010 Performance Targets: N/A

2015 Performance Targets: 10% of lawn mowers and equipment exchanged for electric equipment

2020 Performance Targets: 25% of lawn mowers and equipment exchanged for electric equipment

2035 Performance Targets: 50% of lawn mowers and equipment exchanged for electric equipment

GHG Assumptions:

The use of electric lawn and garden equipment reduces GHG emissions by switching from diesel fuel to electricity, a source with lower GHG emissions.

GHG Sources:

Bay Area Air Quality Management District. 2010. History of the Air District: 1995–2000. http://www.baaqmd.gov/Divisions/Communications-and-Outreach/News-Media-and-Features/History-of-Air-District-2005/1995--2000.aspx.

California Air Resources Board. 2007. Off-Road Software.

9.2 CONSTRUCTION EMISSIONS

Reduce emissions from heavy-duty construction equipment by limiting idling and utilizing cleaner fuels, equipment, and vehicles.

Action Items:

- Action 9.2.1. Minimize idling times either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes or less (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Provide clear signage at all access points to remind employees of idling restrictions.

- Action 9.2.2. Construction equipment shall be maintained in accordance with manufacturer's specifications.

- Action 9.2.3. Work with project applicants to limit GHG emissions from construction equipment by selecting one of the following measures, at a minimum, as appropriate to the construction project:

    a. Substitute electrified equipment for diesel- and gasoline-powered equipment where practical.

    b. Use alternative fuels for construction equipment on-site, where feasible, such as compressed natural gas (CNG), liquefied natural gas (LNG), propane, or biodiesel.

    c. Avoid the use of on-site generators by connecting to grid electricity or utilizing solar-powered equipment.

GHG Reduction:

2010: N/A

2015: -350 $MTCO_2e$

2020: -360 $MTCO_2e$

2035: -450 $MTCO_2e$

Implementation Time Frame:	Mid-Term
Implementing Department:	Community Development
Supporting Agencies:	Bay Area Air Quality Management District
Mandatory or Voluntary:	Mandatory
2010 Performance Targets:	N/A
2015 Performance Targets:	40% reduction in idling times for construction equipment
2020 Performance Targets:	40% reduction in idling times for construction equipment
2035 Performance Targets:	40% reduction in idling times for construction equipment

GHG Assumptions:

It is estimated that idling accounts for 5% of all fuel used in construction equipment. Substituting electrified equipment or alternatively fueled equipment is estimated to reduce GHG emissions associated with fuel use by approximately 2%.

GHG Sources:

California Air Pollution Control Officers Association. 2010. Quantifying Greenhouse Gas Mitigation Measures.

APPENDIX C –

COSTS & SAVINGS

City of Santa Rosa
Community Development

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APPENDIX C: COSTS & SAVINGS

The following cost ranges are utilized for both the costs to the City and the community:

Costs ($)	Range
0	Minimal
1–25,000	Low
25,001–100,000	Low-Mid
100,001–200,000	Medium
200,001–500,000	Medium-High
Over 500,000	High

1.1 CALGREEN REQUIREMENTS FOR NEW CONSTRUCTION

City Costs: Minimal
City Savings: Minimal
Community Costs: High
Community Savings: Low-Mid
Potential Funding Sources: California Energy Commission
Cost Assumptions:
Costs to the City are anticipated to be minimal. The community costs to comply with CALGreen are estimated at approximately $1,500 per residential unit and between $0.50 and $1 per square foot of non-residenital spacebut will not result in additional fees or review time. It should be noted that the City has already formally adopted the Tier 1 requirements of CALGreen.
Cost Sources:
N/A

1.2 ENERGY EFFICIENCY IN EXISTING BUILDINGS

City Costs: High
City Savings: Minimal
Community Costs: High
Community Savings: High
Potential Funding Sources: Sonoma County Energy Independence Program
Cost Assumptions:
Costs to the City will primarily include allocating staff time and resources for preparing the retrofit program and participating in regional efforts such as the SCEIP progam and RCPA.

Cost Sources:
Pacific Gas & Electric Company. 2011.
http://www.pge.com/tariffs/GRF.SHTML#RESGAS_BASELINE.

1.3 SMART METER UTILIZATION

City Costs: Minimal
City Savings: Minimal
Community Costs: Minimal
Community Savings: High
Potential Funding Sources: N/A
Cost Assumptions:
PG&E and the CPUC are the primary implementers of this program. The installation of these meters has been funded primarily through American Reinvestment and Recovery Act Funds.
Cost Sources:
Pacific Gas & Electric Company. 2011.
http://www.pge.com/tariffs/GRF.SHTML#RESGAS_BASELINE.

1.4 TREE PLANTING AND URBAN FORESTRY

City Costs: Low-Mid
City Savings: Minimal
Community Costs: Medium-High
Community Savings: Medium-High
Potential Funding Sources: Strategic Growth Council Grants
Cost Assumptions:
Costs to the community will include the estimated cost of planting each new tree while savings will result from reduced electricity use. Minimal costs to the City are anticipated.
Cost Sources:
N/A

1.5 COOL ROOFS AND PAVEMENTS

City Costs: Low-Mid
City Savings: Minimal
Community Costs: Low
Community Savings: Low
Potential Funding Sources: Strategic Growth Council Grants, Caltrans Grants

Cost Assumptions:
The costs to develop a green streets pilot program will be the responsibility of the City. Other green streets programs have cost local governments between $500,000 and $1 million. Costs to the community to install cool roofs and paving will likely be incorporated into new projects at a minimal cost. Retrofits to install cool roofs and paving will likely add a nominal cost based on a premium for materials with higher reflectivity.
Cost Sources:
Pacific Gas & Electric Company. 2011.
http://www.pge.com/tariffs/GRF.SHTML#RESGAS_BASELINE.

1.6 ENERGY-EFFICIENT APPLIANCES

City Costs: Medium
City Savings: Minimal
Community Costs: Medium-High
Community Savings: Medium
Potential Funding Sources: California Energy Commission
Cost Assumptions:
The City will need to provide funding for distributing rebates to residents and businesses. The cost of this program will depend on the total number of rebates distributed and the monetary value of the rebate.
Cost Sources:
Pacific Gas & Electric Company. 2011.
http://www.pge.com/tariffs/GRF.SHTML#RESGAS_BASELINE.

1.7 APPLIANCE ELECTRIFICATION

City Costs: Minimal
City Savings: Minimal
Community Costs: Minimal
Community Savings: Minimal
Potential Funding Sources: California Energy Commission
Cost Assumptions:
The cost of this measure to the city will be integrated with the appliance rebate program. Community costs and savings will not be significant as this measure aims to switch from one fuel source to another meaning there may be a savings in natural gas costs, but an increase of electricity costs.
Cost Sources:
Pacific Gas & Electric Company. 2011.
http://www.pge.com/tariffs/GRF.SHTML#RESGAS_BASELINE.

2.1 SMALL-SCALE RENEWABLE ENERGY INSTALLATIONS

City Costs: Minimal
City Savings: Minimal
Community Costs: Minimal
Community Savings: Minimal
Potential Funding Sources: N/A
Cost Assumptions:
Costs to the City can be minimized by implementing this policy during a regular update of the Zoning Code.
Community costs to incorporate wiring and plumbing for solar and electric vehicles is significantly lower when incorporated into development plans than trying to retrofit a building to accommodate these features.
Cost Sources:
N/A

2.2 RENEWABLE ENERGY FINANCING

City Costs: Low-Mid
City Savings: Minimal
Community Costs: High
Community Savings: High
Potential Funding Sources: Sonoma County Energy Independence Program, California Energy Commission, PG&E, California Solar Initiative
Cost Assumptions:
City costs will be minimized through their participation in SCEIP. Costs to the community will range based on the size of the renewable energy systems, though many of those costs can be offset through incentives and rebates.
Cost Sources:
California Solar Initiative. 2011. Program Costs and Rebates.
Go Solar California. 2010. http://www.gosolarcalifornia.org/professionals/2-17-10_CalFIRST_FACT_SHEET.pdf.

2.3 RENEWABLE POWER GENERATION

City Costs: Medium-High
City Savings: Minimal
Community Costs: Minimal
Community Savings: Minimal
Potential Funding Sources: N/A

Cost Assumptions:
In 2010, the County of Marin allocated $1.5 million in loan advances to start the Marin Energy Authority, which has an annual operating budget of $18 million as of 2011. Santa Rosa's costs to join this program may be lower than the initial $1.5 million, since the program has already been established and staffed. If Sonoma County or the City of Santa Rosa chooses to pursue a CCA program instead of joining the Marin County program, these costs to the City may be higher.
Cost Sources:
Marin Energy Authority. 2011.
http://marincleanenergy.info/images/stories/MEA_Board_Packet_2.03.11.pdf.

3.1 DENSITY

City Costs: Unknown
City Savings: Unknown
Community Costs: Minimal
Community Savings: High
Potential Funding Sources: N/A
Cost Assumptions:
Savings to the community are based on the estimated VMT reductions and historic trends in IRS federal reimbursement rates per mile.
Cost Sources:
U.S. Internal Revenue Service. 2011. Federal Reimbursement Rate.
http://www.irs.gov/taxpros/article/0,,id=156624,00.html.

3.2 DIVERSITY AND DESTINATION ACCESSIBILITY

City Costs: Unknown
City Savings: Unknown
Community Costs: Minimal
Community Savings: Medium-High
Potential Funding Sources: N/A
Cost Assumptions:
Savings to the community are based on the estimated VMT reductions and historic trends in IRS federal reimbursement rates per mile.
Cost Sources:
U.S. Internal Revenue Service. 2011. Federal Reimbursement Rate.
http://www.irs.gov/taxpros/article/0,,id=156624,00.html.

3.3 AFFORDABLE HOUSING

City Costs: Minimal
City Savings: Minimal
Community Costs: Minimal
Community Savings: Medium-High
Potential Funding Sources: City Inclusionary Housing Fees, HUD Grants
Cost Assumptions:
Savings to the community are based on the estimated VMT reductions and historic trends in IRS federal reimbursement rates per mile.
Cost Sources:
U.S. Internal Revenue Service. 2011. Federal Reimbursement Rate. http://www.irs.gov/taxpros/article/0,,id=156624,00.html.

3.4 PARKING SUPPLY LIMITS

City Costs: Low-Mid
City Savings: Minimal
Community Costs: Minimal
Community Savings: High
Potential Funding Sources: N/A
Cost Assumptions:
Savings to the community are based on the estimated VMT reductions and historic trends in IRS federal reimbursement rates per mile.
Cost Sources:
U.S. Internal Revenue Service. 2011. Federal Reimbursement Rate. http://www.irs.gov/taxpros/article/0,,id=156624,00.html.

3.5 UNBUNDLE PARKING COSTS

City Costs: Minimal
City Savings: Minimal
Community Costs: Minimal
Community Savings: Medium-High
Potential Funding Sources: N/A
Cost Assumptions:
Savings to the community are based on the estimated VMT reductions and historic trends in IRS federal reimbursement rates per mile.
Cost Sources:

U.S. Internal Revenue Service. 2011. Federal Reimbursement Rate. http://www.irs.gov/taxpros/article/0,,id=156624,00.html.

3.6 TRAFFIC CALMING

City Costs: Medium-High
City Savings: Minimal
Community Costs: Minimal
Community Savings: Medium
Potential Funding Sources: Caltrans, Strategic Growth Council Grants
Cost Assumptions:
Savings to the community are based on the estimated VMT reductions and historic trends in IRS federal reimbursement rates per mile.
Cost Sources:
U.S. Internal Revenue Service. 2011. Federal Reimbursement Rate. http://www.irs.gov/taxpros/article/0,,id=156624,00.html.

4.1 BICYCLE AND PEDESTRIAN NETWORK

City Costs: Minimal
City Savings: Minimal
Community Costs: Minimal
Community Savings: Medium-High
Potential Funding Sources: Caltrans, Strategic Growth Council Grants
Cost Assumptions:
Costs to the City to implement the bike and pedestrian master plan are discussed in Appendix U of the Santa Rosa Bike and Pedestrian Master Plan. The CAP is not anticipated to add costs beyond that plan. Savings to the community are based on the estimated VMT reductions and historic trends in IRS federal reimbursement rates per mile.
Cost Sources:
City of Santa Rosa. 2010. Bicycle and Pedestrian Master Plan. http://ci.santa-rosa.ca.us/doclib/Documents/Appendix%20U.pdf.

U.S. Internal Revenue Service. 2011. Federal Reimbursement Rate. http://www.irs.gov/taxpros/article/0,,id=156624,00.html.

4.2 TRANSIT SYSTEM IMPROVEMENTS

City Costs: Medium
City Savings: Minimal
Community Costs: Minimal

Community Savings: Medium-High
Potential Funding Sources: Department of Transportation TIGER Grants, MTC
Cost Assumptions:
Savings to the community are based on the estimated VMT reductions and historic trends in IRS federal reimbursement rates per mile.
Cost Sources:
City of Santa Rosa. 2010. Bicycle and Pedestrian Master Plan. http://ci.santa-rosa.ca.us/doclib/Documents/Appendix%20U.pdf.

U.S. Internal Revenue Service. 2011. Federal Reimbursement Rate. http://www.irs.gov/taxpros/article/0,,id=156624,00.html.

4.3 CAR SHARING AND TRANSPORTATION DEMAND MANAGEMENT PROGRAMS

City Costs: Low
City Savings: Minimal
Community Costs: Minimal
Community Savings: Medium-High
Potential Funding Sources: N/A
Cost Assumptions:
Savings to the community are based on the estimated VMT reductions and historic trends in IRS federal reimbursement rates per mile.
Cost Sources:
U.S. Internal Revenue Service. 2011. Federal Reimbursement Rate. http://www.irs.gov/taxpros/article/0,,id=156624,00.html.

4.4 CAR-FREE SUNDAYS

City Costs: Unknown
City Savings: Unknown
Community Costs: Unknown
Community Savings: Unknown
Potential Funding Sources: N/A
Cost Assumptions:
Prior to implementing this policy, the costs to the City will need to be evaluated in more detail and may consider additional staff time and equipment to facilitate street closures, and staffing at events.
Cost Sources:

N/A

4.5 TELECOMMUTING

City Costs: Minimal
City Savings: Minimal
Community Costs: Minimal
Community Savings: Minimal
Potential Funding Sources: U.S. Department of Energy, DOT, PG&E, California Energy Commission
Cost Assumptions:
Savings to the community are based on the estimated VMT reductions and historic trends in IRS federal reimbursement rates per mile. Measure 5.1 provides discussion of the cost of electric vehicles and charging stations.
Cost Sources:
U.S. Internal Revenue Service. 2011. Federal Reimbursement Rate. *http://www.irs.gov/taxpros/article/0,,id=156624,00.html*.

5.1 ELECTRIC AND HYBRID-ELECTRIC VEHICLES

City Costs: Low-Mid
City Savings: Minimal
Community Costs: Medium-High
Community Savings: Medium
Potential Funding Sources: U.S. Department of Energy, DOT, PG&E, California Energy Commission
Cost Assumptions:
The costs to the City and community are based on the estimated costs for the design and installation of EV charging stations and the estimated average premium of the cost of an electric vehicle compared to a conventional internal combustion engine vehicle.
Cost Sources:
N/A

5.2 BIOFUEL, FUEL CELL, AND ALTERNATIVE FUELS

City Costs: Unknown
City Savings: Unknown
Community Costs: Unknown
Community Savings: Unknown
Potential Funding Sources: California Air Resources Board
Cost Assumptions:

N/A
Cost Sources:
N/A

5.3 ANTI-IDLING

City Costs: Low
City Savings: Minimal
Community Costs: Minimal
Community Savings: Medium-High
Potential Funding Sources: N/A
Cost Assumptions:
Savings to the community are based on the estimated VMT reductions and historic trends in IRS federal reimbursement rates per mile.
Cost Sources:
U.S. Internal Revenue Service. 2011. Federal Reimbursement Rate. http://www.irs.gov/taxpros/article/0,,id=156624,00.html.

5.4 NEIGHBORHOOD ELECTRIC VEHICLES

City Costs: Medium
City Savings: Minimal
Community Costs: High
Community Savings: Medium-High
Potential Funding Sources: California Air Resources Board
Cost Assumptions:
Estimates a cost of approximately $8,000 per new NEV. Some of that cost can be off-set by rebates and incentives.
Cost Sources:
N/A

6.1 RECYCLING AND COMPOSTING

City Costs: Minimal
City Savings: Minimal
Community Costs: Minimal
Community Savings: Minimal
Potential Funding Sources: CalRecycle
Cost Assumptions:

A small amount of staff time would be necessary to ensure successful implementation of this measure.
Cost Sources:
N/A

6.2 MATERIALS MANAGEMENT

City Costs: Minimal
City Savings: Minimal
Community Costs: Minimal
Community Savings: Minimal
Potential Funding Sources: CalRecycle
Cost Assumptions:
A small amount of staff time would be necessary to ensure successful implementation of this measure.
Cost Sources:
N/A

7.1 WATER CONSERVATION

City Costs: Medium
City Savings: Minimal
Community Costs: Medium
Community Savings: High
Potential Funding Sources: California Department of Water Resources; water rates and demand fees
Cost Assumptions:
Savings to the community are based on City of Santa Rosa current water rates.
Cost Sources:
City of Santa Rosa. 2011. 2010 Urban Water Management Plan. http://ci.santa-rosa.ca.us/doclib/Documents/Final_2010_UWMP_Complete_CityofSantaRosa.pdf.

7.2 WASTEWATER AND WATER OPERATIONS

City Costs: Medium-High
City Savings: Low-Mid
Community Costs: Minimal
Community Savings: Minimal
Potential Funding Sources: California Energy Commission
Cost Assumptions:

Savings to the City are based on the cost of energy that will be decreased. It is anticipated that the City will need to secure a significant amount of funding, bonds, or loans in order to reduce energy use and increase renewable enery generation at the Laguna Treatment Plant. Due to the high variability of renewable energy projects available to the treatment plant, i.e. solar PV, fuel cells, methane gas capture, costs associated with possible projects could not be quantified with specificity.

Cost Sources:

PG&E. 2011. http://www.pge.com/tariffs/GRF.SHTML#RESGAS_BASELINE.

7.3 RECYCLED WATER

City Costs: High
City Savings: Minimal
Community Costs: Minimal
Community Savings: Minimal
Potential Funding Sources: State Prop 50 grant; Water Resources Development Act, Title 16

Cost Assumptions:

Costs to the City are based on estimated infrastructure improvements needed to expand recycled water use.

Cost Sources:

City of Santa Rosa. 2011. 2010 Urban Water Management Plan. http://ci.santa-rosa.ca.us/doclib/Documents/Final_2010_UWMP_Complete_CityofSantaRosa.pdf.

8.1 LAWN AND GARDEN ACTIVITY

City Costs: Unknown
City Savings: Unknown
Community Costs: Unknown
Community Savings: Unknown
Potential Funding Sources: Strategic Growth Council Grants, Community Health Organizations

Cost Assumptions:

N/A

Cost Sources:

N/A

9.1 LAWN AND GARDEN ACTIVITY

City Costs: Minimal
City Savings: Minimal
Community Costs: Minimal

Community Savings: Minimal
Potential Funding Sources: Bay Area Air Quality Management District, California Air Resources Board
Cost Assumptions:
The City will need to create an ordinance to implement this policy.
Cost Sources:
N/A

9.2 CONSTRUCTION EMISSIONS

City Costs: Minimal
City Savings: Minimal
Community Costs: Minimal
Community Savings: Minimal
Potential Funding Sources: Bay Area Air Quality Management District, California Air Resources Board
Cost Assumptions:
N/A
Cost Sources:
N/A

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APPENDIX D –
BAAQMD COMPLIANCE

City of Santa Rosa
Community Development

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APPENDIX D: BAAQMD COMPLIANCE

The City of Santa Rosa developed this Climate Action Plan to meet the requirements of the Bay Area Air Quality Management District's (BAAQMD) criteria for a Qualified Greenhouse Gas Reduction Strategy as defined in the BAAQMD's California Environmental Quality Act (CEQA) Air Quality Guidelines. The CEQA Air Quality Guidelines were updated in 2010 in response to the State of California's amendment to the State CEQA Guidelines through Senate Bill 97 (SB 97). SB 97 requires all projects subject to CEQA to analyze and mitigate the greenhouse gas emissions that will occur.

The purpose of the BAAQMD CEQA Air Quality Guidelines is to assist lead agencies in evaluating the air quality impacts of proposed projects and plans within the San Francisco Bay Area Air Basin. The guidelines were updated to establish thresholds of significance for impacts related to greenhouse gas (GHG) emissions to be consistent with the requirements of the California Environmental Quality Act. These thresholds can be used to assess plan-level and project-level impacts and allow a lead agency to determine that a project's impact on GHG emissions is less than significant if it is in compliance with a Qualified Greenhouse Gas Reduction Strategy.

The City's Climate Action Plan follows both the State CEQA Guidelines and BAAQMD's guidelines by incorporating the standard elements of a Qualified GHG Reduction Strategy into the CAP. The standard elements of a Qualified GHG Reduction Strategy include the following steps:

1. Quantify greenhouse gas emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic range.

2. Establish a level, based on substantial evidence below which the contribution to greenhouse gas emissions from activities covered by the plan would not be cumulatively considerable.

3. Identify and analyze the greenhouse gas emissions resulting from specific actions or categories of actions anticipated within the geographic area.

4. Specify measures or a group of measures, including performance standards that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions level.

5. Monitor the plan's progress.

6. Adopt the greenhouse gas reduction strategy in a public process following environmental review.

The remainder of this appendix describes in detail how the City's Climate Action Plan has been developed to satisfy the requirements of the BAAQMD's guidelines on the standard elements of a Qualified GHG Reduction Strategy and will allow future development projects to determine that a project has a less than significant impact on GHG emissions so long as it is in compliance with the City's CAP.

GHG EMISSIONS INVENTORY

The first component of a Qualified GHG Reduction Strategy is to conduct an inventory of GHG emissions within a specified geographic boundary. The City of Santa Rosa's GHG inventory utilizes a baseline year of 2007 to inventory carbon dioxide (CO_2), nitrous oxide (N_2O), and methane (CH_4) generated from activities by the Santa Rosa community.

The emissions sources calculated in the baseline GHG inventory include commercial, residential, and industrial electricity and natural gas use, on-road transportation, solid waste disposal, energy use and direct process emissions related to water and wastewater, and off-road equipment use for construction and lawn and garden activities. GHG emissions from these activities were calculated from activity data such as kilowatt hours of electricity, therms of natural gas, tons of waste disposed, and vehicle miles traveled (VMT) from trips with an origin or destination in Santa Rosa. In 2007, the City of Santa Rosa emitted approximately 1,321,250 metric tons of carbon dioxide equivalents ($MTCO_2e$) (see **Table D-1** and **Figure D-1**).

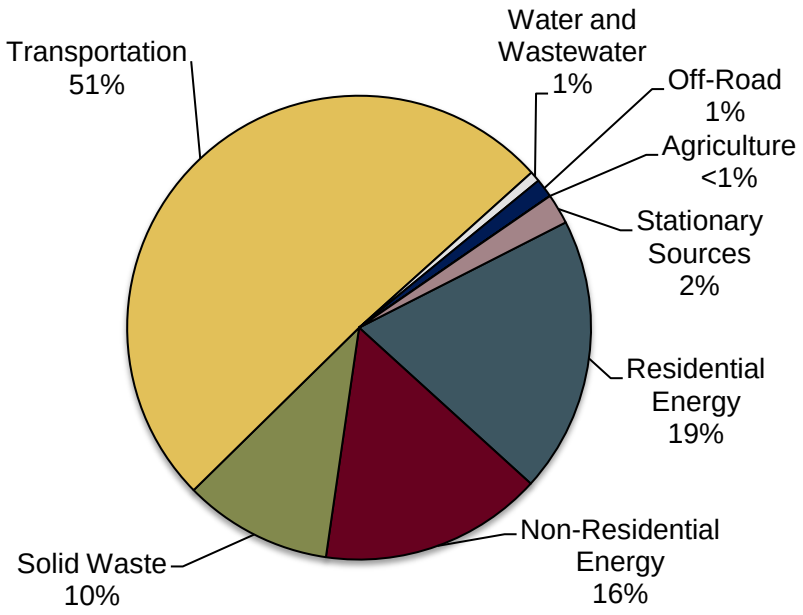
Stationary source emissions have also been examined in this emissions inventory. Stationary sources are defined as any fixed emitter of air pollutants, such as power plants, petroleum refineries, petrochemical plants, food processing plants, and other heavy industrial sources. The BAAQMD provided a list of stationary source emissions within the City of Santa Rosa totaling 28,440 $MTCO_2$ in 2007.

Stationary source emissions are included in the GHG emissions reduction strategy for informational purposes only, as stationary source emissions are most effectively addressed and regulated by the BAAQMD or through federal and state programs. The baseline inventory is intended to guide future local policy decisions that relate to emissions within the City's control; therefore, stationary source emissions are excluded from all further discussions of the inventory for the purpose of setting accurate emissions reduction targets.

TABLE D-1: 2007 COMMUNITY-WIDE BASELINE EMISSIONS BY SECTOR

Sector	Metric Tons CO_2e/year	Percentage of Total
Residential Energy	259,640	19%
Non-Residential Energy	209,880	16%
Solid Waste	139,770	10%
Transportation	684,280	51%
Water and Wastewater	9,840	1%
Off-Road	17,670	1%
Agriculture	170	<1%
TOTAL	**1,321,250**	**100%**

FIGURE D-1: 2007 COMMUNITY-WIDE BASELINE EMISSIONS BY SECTOR



GHG EMISSIONS PROJECTIONS

The basis for all growth scenarios is a business-as-usual (BAU) projection. The BAU projection forecasts emissions to reflect the City's growth projections without regulatory or technical intervention to reduce GHG emissions. The BAU projection is based on population, housing, employment, and vehicle miles traveled projections for 2015, 2020, and 2035. The population, housing, and employment forecasts are based on the City's General Plan, while VMT projections are derived from the Sonoma County Transportation Authority's Travel Demand Forecast Model.

TABLE D-2: SANTA ROSA COMMUNITY GROWTH INDICATORS

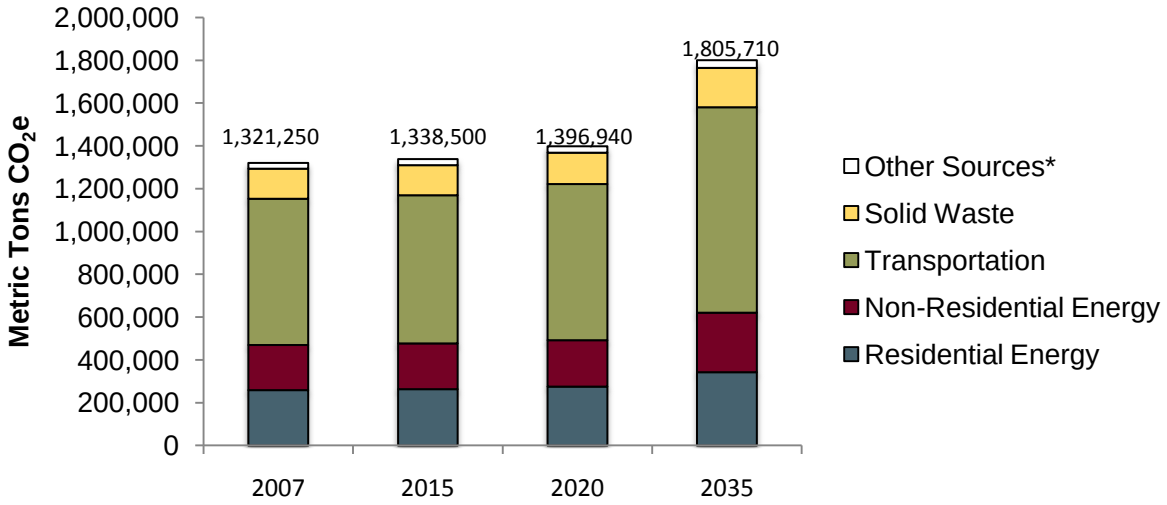
	2007	2010	2015	2020	2035
Population	180,500	179,900	181,900	190,200	233,520
Households	71,100	71,600	72,400	75,700	94,800
Non-Residential Square Footage	30,771,500	31,109,900	31,309,900	31,609,900	40,730,600
Employment	98,000	98,400	99,700	102,400	128,400
Service Population	278,500	278,300	281,600	292,600	369,300

These indicators are then applied to the 2007 GHG emissions inventory to determine a business-as-usual growth scenario. Under the business-as-usual scenario, community-wide emissions will grow by approximately 6% by the year 2020 to 1,396,940 $MTCO_2e$ and by 37% by 2035 to 1,805,710 $MTCO_2e$, as shown in **Table D-3** and **Figure D-2**.

TABLE D-3: SANTA ROSA COMMUNITY GHG EMISSIONS FORECAST

Sector	2007 $MTCO_2e$/Yr	2015 $MTCO_2e$/Yr	2020 $MTCO_2e$/Yr	2035 $MTCO_2e$/Yr
Residential Energy	259,640	264,360	276,420	346,470
Non-Residential Energy	209,880	213,550	215,600	277,810
Solid Waste	139,770	141,340	146,860	185,340
Transportation	684,280	691,190	728,820	959,470
Water and Wastewater	9,840	9,950	10,340	13,040
Off-Road	17,670	17,990	18,810	23,580
Agriculture	170	120	90	0
TOTAL	**1,321,250**	**1,338,500**	**1,396,940**	**1,805,710**
Percentage Change from 2007	0%	1%	6%	37%

FIGURE D-2: BUSINESS-AS-USUAL GHG FORECAST, 2007–2035



** Other Sources include water and wastewater, agriculture, and off-road emissions representing less than 2% of the inventory.*

In addition to AB 32, California has adopted and started to implement several state-level programs that will impact local GHG emissions. In order to effectively determine the emissions reductions that will need to be implemented at the local level to meet the City's emissions reduction target, the impact of state-level programs has been incorporated into an adjusted business-as-usual forecast. The state-level programs included in this adjusted forecast include the Renewable Portfolio Standard (RPS), updates to Title 24 Energy Efficiency Standards, California Solar Initiative Rebates, and the implementation of the Clean Car Fuel Standard, commonly referred to as the Pavley Standard. The impact of these state programs (shown in **Table D-4**) will play a critical role in helping Santa Rosa to achieve the emissions reduction target.

TABLE D-4: STATE REDUCTIONS SUMMARY

	2007	2015	2020	2035
Business-As-Usual Emissions	1,321,240	1,338,510	1,396,950	1,805,720
Renewable Portfolio Standard (RPS)	–	-26,700	-43,640	-95,680
AB 1493 (Pavley) Vehicle Standards	–	-49,780	-101,820	-220,760
CALGreen Building Standards	–	-7,920	-16,290	-70,600
Subtotal State Reduction Efforts	–	-84,400	-161,760	-387,040
Net Emissions	1,321,240	1,254,110	1,235,180	1,418,680
Percentage Change from 2007 Levels	0%	-5%	-6%	7%

GHG EMISSIONS REDUCTION TARGET

The City of Santa Rosa has set a GHG emissions reduction target of 25% below 1990 levels by 2015. With just three years left to achieve that target, this Climate Action Plan outlines a path for achieving the target by 2020. This target is equivalent to a 37% reduction in GHG emissions from baseline 2007 levels and exceeds the State's direction to local governments in the AB 32 Scoping Plan by approximately 22%.

GHG REDUCTION MEASURES

The GHG reduction measures included in this Climate Action Plan demonstrate the City's ability to reach the GHG reduction target of 25% below 1990 levels by 2020. Emissions reductions were quantified for four different years: 2010, 2015, 2020, and 2035. Emissions reductions for 2010 have been quantified to demonstrate the actual emissions reduction progress that the City has already made in implementing measures within the CAP, while the 2015, 2020, and 2035 emissions reductions are the potential reductions that will be achieved through the implementation of these measures over the next several years. The GHG reduction strategies are separated by goal or topic area to correspond with the sectors and sources of GHG emissions as follows:

1. Energy Efficiency and Conservation
2. Renewable Energy
3. Parking and Land Use Management
4. Improved Transport Options
5. Optimized Vehicular Travel
6. Waste Reduction, Recycling, and Composting
7. Water and Wastewater
8. Agriculture and Local Food
9. Off-Road Vehicles and Equipment

It is important to identify how the City will meet or exceed the minimum GHG reduction target of 15% below baseline levels by 2020 to ensure the City can utilize the Climate Action Plan as a Qualified GHG Reduction Strategy for use in environmental review of projects. This Plan identifies a clear path to allow the City to reach the community-wide GHG reduction target of 25% below 1990 levels which, in turn, meets the state targets as well.

The reduction measures included in this Plan are a diverse mix of regulatory and incentive-based programs. The reduction measures aim to reduce GHG emissions from each source to avoid reliance on any one strategy or sector to achieve the target. In total, existing actions, state programs, and GHG reduction measures in this Plan will reduce GHG emissions in the City of Santa Rosa in 2020 by 558,090 $MTCO_2e$ (see **Table D-5** and **Figure D-3**), more than double the required GHG reductions necessary to meet AB 32 targets. **Figure D-4** identifies the GHG reductions to be achieved by 2020 by goal.

TABLE D-5: GHG REDUCTION SUMMARY BY TOPIC

Goal Topic	2015	2020	2035
State Programs	-84,400	-161,760	-387,040
Existing Local Programs	-26,920	-27,640	-40,110
Energy Efficiency and Conservation	-26,060	-117,690	-142,340
Renewable Energy	-30,380	-76,830	-85,520
Parking and Land Use Management	-11,860	-32,680	-39,900
Improved Transport Options	-3,080	-13,130	-15,960
Optimized Vehicular Travel	-19,980	-59,850	-122,070
Waste Reduction, Recycling, and Composting	-25,170	-64,370	-129,720
Water and Wastewater	-2,410	-3,750	-6,170
Agriculture and Local Food	0	0	0
Off-Road Vehicles and Equipment	-360	-380	-500
Total GHG Reductions	**-277,420**	**-558,080**	**-969,330**

FIGURE D-3: 2020 GHG REDUCTIONS BY IMPLEMENTATION STATUS ($MTCO_2e$)

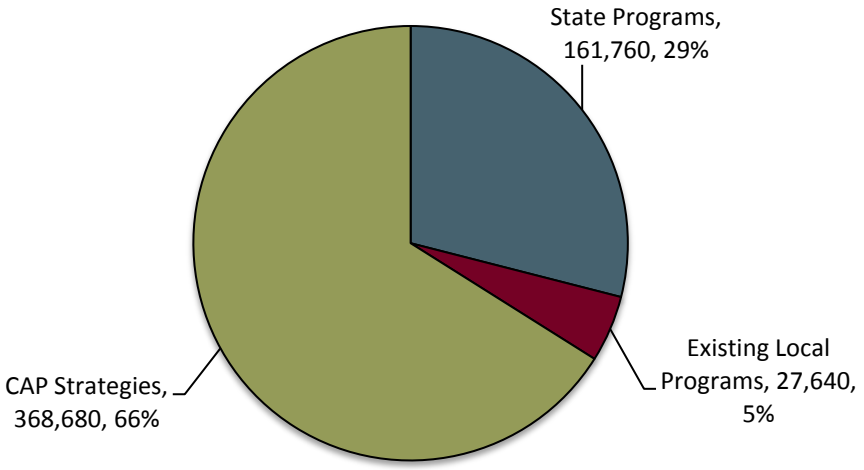
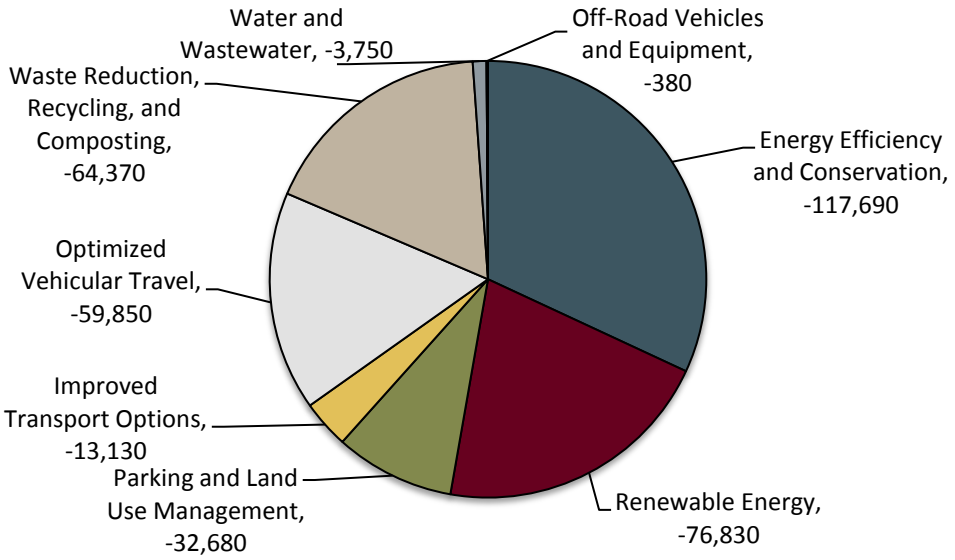
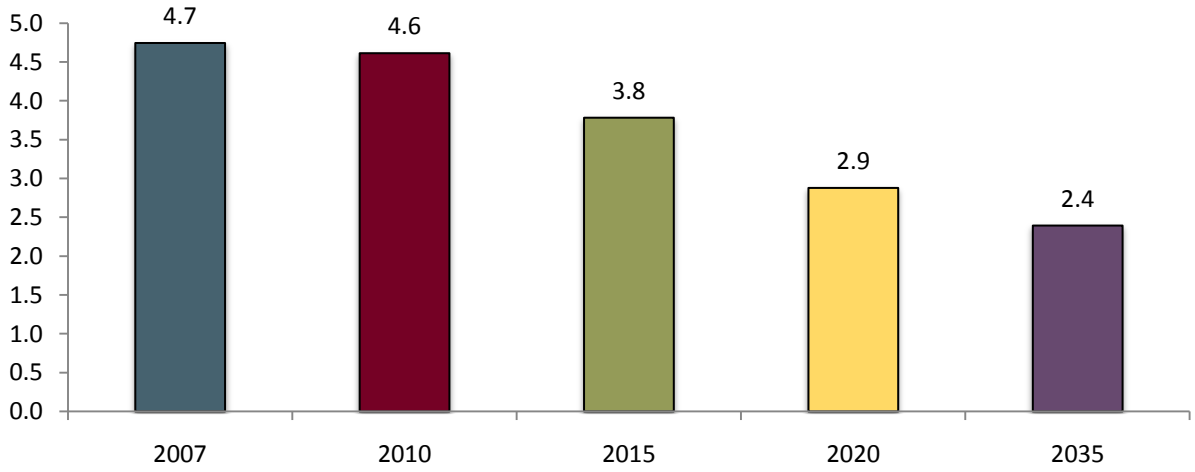


FIGURE D-4: 2020 EMISSIONS REDUCTIONS BY GOAL ($MTCO_2e$)



Achievement of the City's adopted target by 2020 will exceed state recommendations and BAAQMD threshold requirements for developing a Qualified GHG Reduction Strategy by approximately 22%. As shown in **Figure D-5**, through the implementation of this Plan, the City's GHG emissions will decrease from 4.7 $MTCO_2e$ per person per year in 2007 to 2.4 $MTCO_2e$ per person per year in 2035.

FIGURE D-5: GHG EMISSIONS PER SERVICE POPULATION ($MTCO_2e$)



In addition to quantifying the emissions reductions associated with each strategy in the CAP, BAAQMD guidance recommends that the City clearly specify the measures within the CAP applicable to new construction projects to demonstrate compliance with the City's GHG emissions reduction strategy and determine that the project's GHG emissions are less than significant. To

ensure that each new construction project complies with the City's CAP, a checklist has been developed to be submitted by an applicant for each new development project (see **Appendix E**).

IMPLEMENTATION AND MONITORING

To ensure the timely implementation of the City's CAP, the City will identify staff to coordinate City Green Team meetings, track implementation of GHG reduction strategies and progress toward GHG reduction targets, and prepare annual reports to the City Council on CAP implementation and progress. To assist in this reporting, the City has developed an implementation and monitoring tracking tool that identifies the major implementation milestones and the necessary actions to be taken for each measure. The tool enables the City to quickly update the GHG emissions inventory and streamline the reporting of CAP implementation on an annual basis. The monitoring tool also outlines the necessary procedures to update the inventory and reduction measures every 3–5 years. This tool that will serve as the primary instrument in measuring the City's progress toward achieving emissions reduction targets and to ensure timely implementation occurs.

PUBLIC PROCESS AND ENVIRONMENTAL REVIEW

The final requirement of a Qualified GHG Reduction Strategy is to adopt the plan through a public hearing process following environmental review. The City has involved numerous stakeholders throughout the development of the CAP. The Climate Action Plan will undergo environmental review as part of the public hearing and adoption process.

During the development of the CAP, the City has engaged stakeholders and interested community members during three public workshops. A stakeholder working group was also convened to solicit input and feedback from building, public health, housing, and other local groups. The public has also had opportunities to participate in the development of this CAP through the public hearing and review process at Planning Commission and City Council meetings.

In order to operate effectively as a programmatic tiering document, the California State Attorney General's Office and the BAAQMD both recommend integration of components of the GHG emissions reduction strategy into the General Plan. The GHG emissions reduction strategy will contribute to the General Plan's policies and will serve as mitigation for the City's GHG emissions.

The City has prepared a Supplemental EIR to the General Plan EIR, in compliance with the California Environmental Quality Act, finding that the CAP will have a less than significant environmental impact for all impacts analyzed.

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APPENDIX E –

NEW DEVELOPMENT CHECKLIST

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APPENDIX E: CAP NEW DEVELOPMENT CHECKLIST

To ensure new development projects are compliant with the City's Climate Action Plan, the following checklist has been developed. This checklist should be filled out for each new project, subject to discretionary review, to allow new development to find a less than significant impact for greenhouse gas emissions in the environmental review process.

#	Description	Compliance			
		Complies	Does Not Comply	N/A	See Discussion
1.1.1	Comply with CALGreen Tier 1 standards*				
1.1.3	After 2020, all new development will utilize zero net electricity*				
1.3.1	Install real-time energy monitors to track energy use*				
1.4.2	Comply with the City's tree preservation ordinance*				
1.4.3	Provide public & private trees in compliance with the Zoning Code*				
1.5	Install new sidewalks and paving with high solar reflectivity materials*				
2.1.3	Pre-wire and pre-plumb for solar thermal or PV systems				
3.1.2	Support implementation of station plans and corridor plans				
3.2.1	Provide on-site services such as ATMs or dry cleaning to site users				
3.2.2	Improve non-vehicular network to promote walking, biking				
3.2.3	Support mixed-use, higher-density development near services				
3.3.1	Provide affordable housing near transit				
3.5.1	Unbundle parking from property cost				
3.6.1	Install calming features to improve ped/bike experience				
4.1.1	Implement the Bicycle and Pedestrian Master Plan				
4.1.2	Install bicycle parking consistent with regulations*				
4.1.3	Provide bicycle safety training to residents, employees, motorists				
4.2.2	Provide safe spaces to wait for bus arrival				

NEW DEVELOPMENT CHECKLIST

#	Description	Compliance			
		Complies	Does Not Comply	N/A	See Discussion
4.3.2	Work with large employers to provide rideshare programs				
4.3.3	Consider expanding employee programs promoting transit use				
4.3.4	Provide awards for employee use of alternative commute options				
4.3.5	Encourage new employers of 50+ to provide subsidized transit passes*				
4.3.7	Provide space for additional park-and-ride lots				
4.5.1	Include facilities for employees that promote telecommuting				
5.1.2	Install electric vehicle charging equipment				
5.2.1	Provide alternative fuels at new refueling stations*				
6.1.3	Increase diversion of construction waste*				
7.1.1	Reduce potable water use for outdoor landscaping*				
7.1.3	Use water meters which track real-time water use*				
7.3.2	Meet on-site meter separation requirements in locations with current or future recycled water capabilities*				
8.1.3	Establish community gardens and urban farms				
9.1.2	Provide outdoor electrical outlets for charging lawn equipment				
9.1.3	Install low water use landscapes*				
9.2.1	Minimize construction equipment idling time to 5 minutes or less*				
9.2.2	Maintain construction equipment per manufacturer's specs*				
9.2.3	Limit GHG construction equipment emissions by using electrified equipment or alternative fuels*				

**To be in compliance with the CAP, all measures denoted with an asterisk are required in all new development projects unless otherwise specified. If a project cannot meet one or more of the mandatory requirements, substitutions may be made from other measures listed at the discretion of the Community Development Director.*

DISCUSSION (PLEASE LIST POLICY #)

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APPENDIX F –
WORKS CITED

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APPENDIX F: WORKS CITED

Bay Area Air Quality Management District (BAAQMD). 2010. California Environmental Quality Act Air Quality Guidelines. San Francisco: BAAQMD.

California Air Resources Board, California Climate Action Registry, and ICLEI. 2008. Local Government Operations Protocol, Version 1.0. Sacramento: California Air Resources Board.

California Air Resources Board. 2010a. Assembly Bill 32: Global Warming Solutions Act. http://www.arb.ca.gov/cc/ab32/ab32.htm.

———. 2010b. Clean Car Standards – Pavley, Assembly Bill 1493. http://www.arb.ca.gov/cc/ccms/ccms.htm.

———. 2010b. Pavley I and Low Carbon Fuel Standard Postprocessor Version 1.0. http://www.arb.ca.gov/cc/sb375/tools/postprocessor.htm.

California Department of Finance, Demographic Research Unit. 2010. E-5 Population and Housing Estimates for Cities, Counties and the State, 2001–2010, with 2000 Benchmark. http://www.dof.ca.gov/research/demographic/reports/view.php#objCollapsiblePanelEstimatesAnchor.

California Department of Water Resources. 2007. Public Water System Statistics. Sacramento.

California Energy Commission. 2006. Our Changing Climate: Assessing the Risks to California. Web Document. Sacramento: California Energy Commission.

———. 2007. Impact Analysis: 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings.

———. 2009. California Energy Commission's Climate Change Activities. http://www.energy.ca.gov/climatechange/index.html.

California Natural Resources Agency. 2009. California Climate Adaptation Strategy. Sacramento.

California Public Utilities Commission (CPUC). 2009. Renewable Portfolio Standard Implementation Analysis Preliminary Results. http://www.cpuc.ca.gov/NR/rdonlyres/1865C207-FEB5-43CF-99EB-A212B78467F6/0/33PercentRPSImplementationAnalysisInterimReport.pdf.

Carter, P. 2010. Waste Management Specialist, Sonoma County Waste Management Authority. Personal communication. December 13.

City of Santa Rosa. 2007. 2035 General Plan.

Fehr & Peers. 2011. Santa Rosa Greenhouse Gas Reduction Program Transportation Baseline and Future Year VMT Estimates Inventory.

WORKS CITED

Intergovernmental Panel on Climate Change. 2007. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press.

Intergovernmental Panel on Climate Change (IPCC). 1997. Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories. http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.html.

Joseph, John. 2011. Pacific Gas & Electric Company. E-mail correspondence. January 6.

Massachusetts et al. v. Environmental Protection Agency et al. 05-1120 (United States Supreme Court, April 2, 2007).

Met Office, Hadley Centre. 2009. Mapping Climate Impacts. http://webarchive.nationalarchives.gov.uk/20100623194820/http://www.actoncopenhagen.decc.gov.uk/content/en/embeds/flash/4-degrees-large-map-final.

National Academy of Sciences. 2008. Understanding and Responding to Climate Change. Washington DC: The National Academies.

National Oceanic and Atmospheric Administration, National Climatic Data Center. 2008. NOAA Satellite and Information Service. http://www.ncdc.noaa.gov/oa/climate/globalwarming.html#q1.

Rosenweig, C., et al. 2007. Climate Change 2007: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press.

Schwall, J., and D. Carlson. 2011. City of Santa Rosa. E-mail correspondence.

Sonoma County Agriculture Commissioner's Office. 2008. 2007 Sonoma County Crops Report. Santa Rosa, CA.

Sonoma County Climate Protection Campaign. 2008. Greenhouse Gas Emissions Related to Water and Wastewater Services.

Sonoma County Climate Protection Campaign and the Sonoma County Water Agency. 2007. Greenhouse Gas Emissions, Energy Use and Emissions Reduction Potential.

Tufts University. 2009. Tufts Sustainability. http://sustainability.tufts.edu/?pid=31.

University of California Davis. 2010. Agriculture and Resource Economics, Current Cost and Return Studies. http://coststudies.ucdavis.edu/.

U.S. Department of Housing and Urban Development (HUD). 2011. SOCDS Building Permits Database. http://socds.huduser.org/permits/.

U.S. Environmental Protection Agency. 2003. EPA Denies Petition to Regulate Greenhouse Gas Emissions from Motor Vehicles.

———. 2005. Emissions Facts: Greenhouse Gas Emissions from a Typical Passenger Vehicle. http://www.epa.gov/otaq/climate/420f05004.pdf (accessed 1/19/2011).

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